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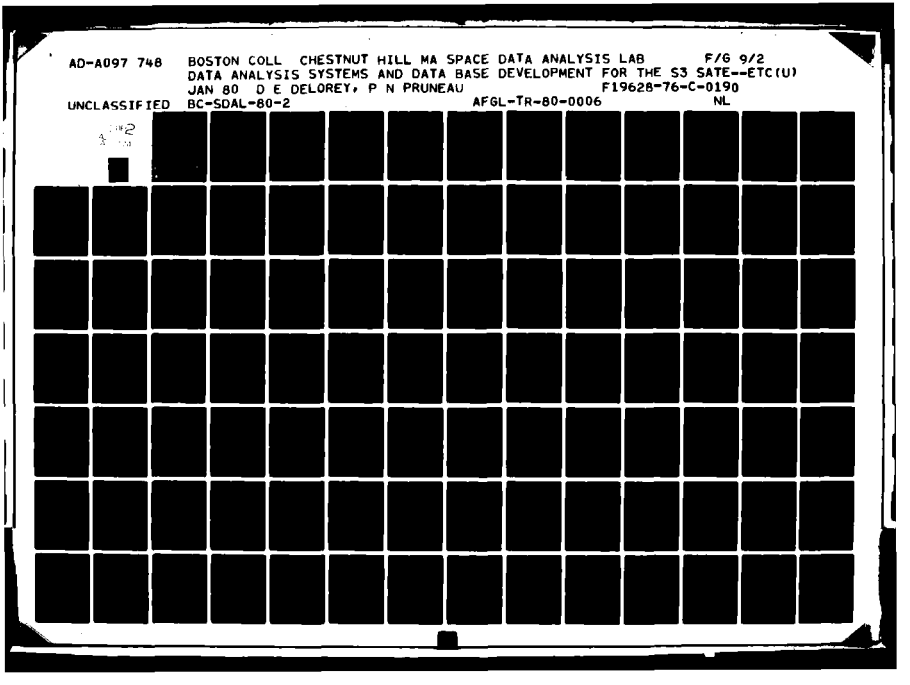

AFGL-TR-80-0008

LEVEL II (12)

DATA ANALYSIS SYSTEMS AND DATA BASE DEVELOPMENT FOR THE S3 SATELLITES

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Data bases have been developed for the S3-1, S3-2 and S3-3 satellites. A data analysis system has been developed for the S3-4 satellite. Summaries of the efforts involved with S3-1, S3-2 and S3-3 vehicles are provided. Full data base definitions for these vehicles are included. The S3-4 data analysis system is defined and Air Force Geophysics Laboratory payloads are described. Analysis requirements for these payloads are included. Spacecraft telemetry and operational modes are outlined.

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PREFACE

The authors wish to thank several members of the Space Data Analysis Laboratory of Boston College for their efforts relating to this contract.

First, for his administrative assistance we wish to thank the Director of the laboratory, Mr. Leo F. Power, Jr.

Analysis, programming and data base development were accomplished through the efforts of (alphabetically) Susan Delay, Kenneth Dieter, Brian Donovan, Neil Grossbard, Timothy Latson, Kevin Martin, Carolyn Parsons, Edward Richards, Lisa Silva, Brian Sullivan, and Roger Vancour.

Thanks go to the Contract Monitor, Mr. Robert E. McInerney, for his assistance during the period of this contract.

Finally, thanks go to Miss Mary Kelly for typing this document.

1.0 INTRODUCTION

The Space Data Analysis Laboratory (SDAL) of Boston College was contracted to develop geophysical unit and user experiment data bases for the S3-1, S3-2 and S3-3 satellites. In addition, analysis studies were performed on these data bases. Work efforts described in this document were performed under contract (F19628-76-C-0190) to the Analysis and Simulation Section (SUWA) of the Air Force Geophysics Laboratory.

This document will summarize the S3 efforts. The analysis used in geophysical unit determination has been detailed in other reports and will not be included here. The data base formats, however, will be included in the appendix.

The volume of data dictated the need for a systematic approach to file development. Hence, structured files and associated program modules were developed for magnetic and ephemeris data (B&L); geophysical support data (GSF); attitude coefficient parameters (OM); and, the geophysical indices.

The functional flow of data has been included in previous documents (e.g. Data Base Development for Air Force Satellites, Delorey) for the S3-1, S3-2 and S3-3 vehicles. The functional flow and program interfaces as well as payload information are included in this document for satellite S3-4. The analyses and associated computer routines for this vehicle have been developed using existing data sets but analysis and data system finalization awaits the receipt of a volume of data.

2.0 SATELLITES S3-1/S3-2/S3-3

A data analysis system was developed for satellite S3-1. This system was then modified for use with the other vehicles in the S3 program.

For each of these vehicles, requirements dictated the need for B&L and OM files. GSF data was required for only the S3-1 and S3-2 spacecrafts. Because of the volume of data, files were created only when spacecraft data was taken. This aided in data compaction and allowed for the data base creation to be performed on an orbit by orbit basis. Satellite Control Facility

(SCF) tape recorder logs were used to determine the time periods for spacecraft operations.

One geophysical index file covering the lifetime of the three vehicles was created.

2.1 Satellite S3-1

Geophysical unit data bases have been created for the ion density gauge (IDG) the MESA accelerometer and for two mass spectrometers (MSI and MSIV). For the MSIV, both neutral high (NH) and ion data bases were created.

For this vehicle, approximately 1500 digital tapes were received. From these tapes, user files for the individual experiments were then created. The user files (along with the auxiliary files) were input to the appropriate analysis routines and the geophysical unit data bases resulted. The final data base for all experiments resides on 10 digital tapes. Thus, the data compaction ratio was 150:1. Coefficient files resulting from polynomial fits to selected parameters (e.g. atmospheric density versus altitude) have been created. These coefficient files have application for history studies. *Coefficient files reside on one tape and hence, for history studies, the* data compaction ratio is 1500:1.

The appendix contains the data base formats for the IDG, MSI, MSIV, MESA, BGL files and GSF files.

A sample of the data base history listing is included in the appendix. This listing summarizes the data by orbit number; start and stop times of the pass; Kp for the pass; and tape number and file number by experiment.

2.2 Satellite S3-2

Digital data (approximately 2300 tapes) has been received for orbits over the 2 1/2 year lifetime of this vehicle.

Requirements included the creation of user files and geophysical unit data bases for a triaxial fluxgate magnetometer, ion density gauge (IDG), mass spectrometer (MSIV) and an electrostatic analyzer (ESA). In addition,

user files were created for the electric field payload (designated 226-1), the energetic proton flux payload (224-1) and the polar wind payload (219-1).

Payload operations were defined for high latitude studies (referred to as group I payloads); for low altitude studies (group II payloads); and for shared operations during which both group I and group II payloads were operated.

Group I operations resulted in the turn on of the fluxgate magnetometer and the ESA. Group II operations included the MSIV and IDG.

The same file creation philosophy used for S3-1 was applied to S3-2 in relation to the B&L and GSF file creations, i.e. one file per pass as opposed to continuous average. The files were, however, segmented by experiment group.

Data bases were created for prescribed portions of the vehicle lifetime for the MSIV, IDG and fluxgate. The ESA data was created for selected passes.

The appendix contains user file formats for all payloads as well as data base formats for the MSIV, IDG, ESA and fluxgate magnetometer. The B&L and GSF formats will not be included since their structure is the same as for satellite S3-1.

2.3 Satellite S3-3

The prime efforts associated with this vehicle involved the creation of user files, OM files and B&L files. The user files were created for the two AFGL payloads. These payloads were the trapped proton monitor (designated 214) and the electric fields - ion drift experiment (designated 215).

Digital data for this vehicle spans a three year period. Approximately 1800 digital tapes were received.

Formats of the user files are contained in the appendix.

3.0 SATELLITE S3-4

The S3-4 satellite is an Air Force vehicle which carried Air Force Geophysics Laboratory (AFGL) payloads designed to measure atmospheric neutral

density and to provide ultraviolet and vacuum ultraviolet background information. The atmospheric neutral density payloads are a Cold Cathode Ionization Density Gauge (CCG), a Particle Flux Accumulator (PFA) and a Rotating Calibration Accelerometer (ROCA). A photometer will provide Vacuum Ultraviolet (VUV) background data and a spectrometer will produce both VUV and Ultraviolet (UV) background information.

A data analysis support system has been defined by the Analysis and Simulation Section (SUWA) of AFGL.

The resulting Data Analysis System (DAS) has been developed. Program interfaces are well defined and analysis techniques have been developed based on a limited amount of data. Finalization of the DAS and the implied analysis techniques awaits agreement on file structures for agency tapes and the corresponding receipt of a volume of data.

Succeeding sections will provide an overview of satellite telemetry, the DAS and payload information.

3.1 Telemetry

The data from the vehicle is Pulse Code Modulated (PCM). Each mainframe consists of 120 words, 8 bits per word. The data, however, may be acquired at two data rates (32kbps and 64kbps). In general, the mainframe word locations for the designations are different for the two data rates. The 32kbps data rate shall be designated as Format A and the 64KBPS data rate shall be designated as Format C. A masterframe (one readout of each sub-commutated value) is 32 frames in Format A and 64 frames in Format C. The telemetry system may be summarized as follows:

8 bits/word
120 words/mainframe
960 bits/mainframe

Format A		Format C
32K	BITS/SEC	64K
33.33	FRAMES/SEC	66.67
.03	SEC/FRAME	.015

Subcommutated Data (Format A)

MF Word No.	Subcom Length
25	8
26	8
82	32
83	32

Subcommutated Data (Format C)

MF Word No.	Subcom Length
42	64
43	64
69	16
70	16

The Vehicle Time Clock Word (VTCW) is made up of 24 bits which increment approximately every .2 seconds. The VTCW is located on MF 42, 43 and 44 in format A and MF 81, 82 and 83 in format C.

The tape recorder aboard the vehicle can record 90 minutes of data in format A and 45 minutes of data in format C. The data stored on the tape recorder is to be played back at 256kbps.

Data will be acquired from two types of orbital operations: approximately 90 minutes of data in format A or approximately 45 minutes of data in format C.

3.2 Data Analysis System

This section is intended to overview the flow of data through the DAS.

In Figure 1, the functional flow of data through the DAS is depicted.

The PCM data from the vehicle will be recorded on instrumentation tape by the Satellite Control Facility (SCF). The tape will be sent to a digitization facility where three separate digital tapes will be created. One tape will contain spectrometer and photometer data; another will contain the PFA

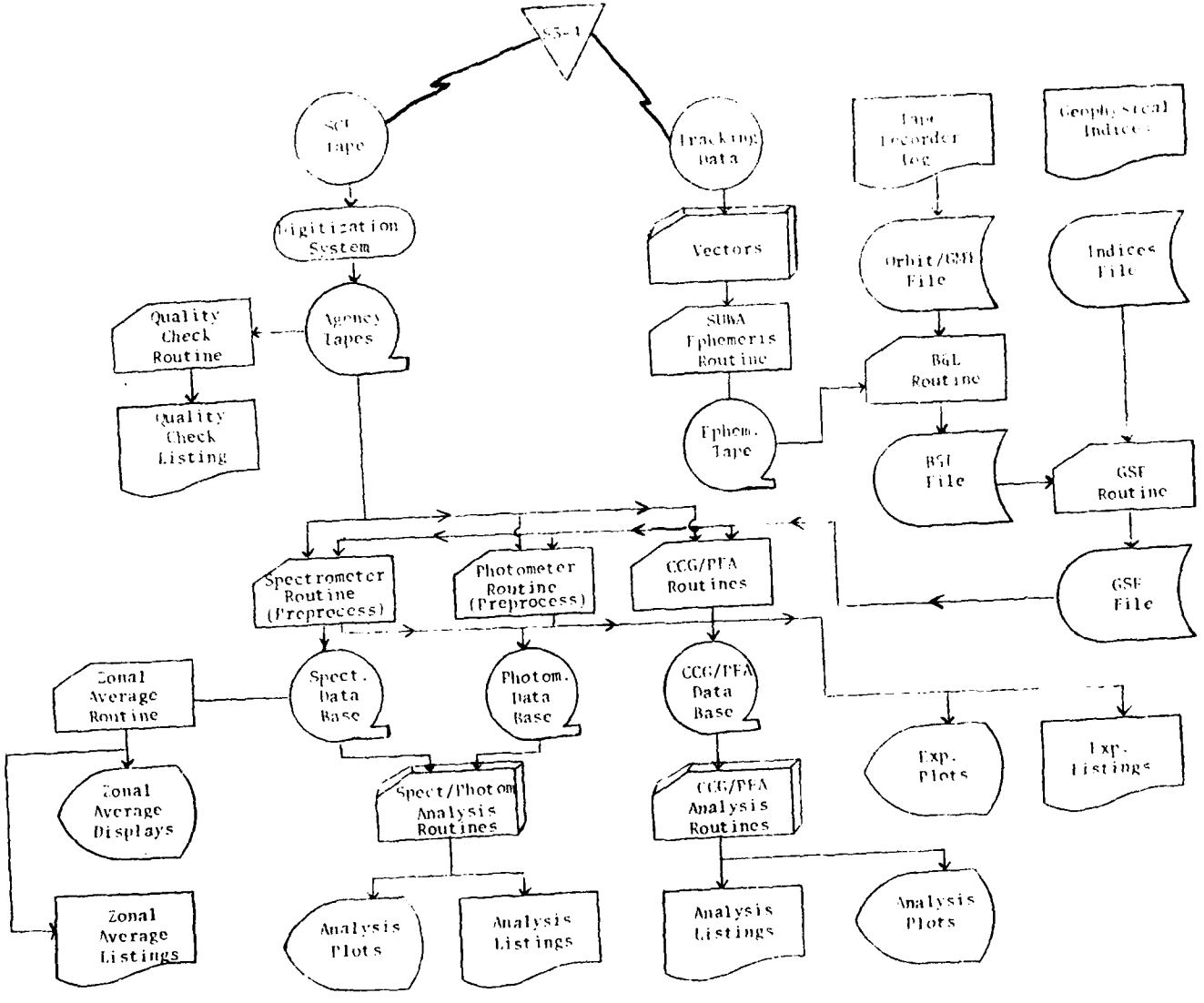

S/C Tape
Tracking Data
Digitization System
Vectors
Tape Recorder Log
Geophysical Indices
Quality Check Routine
Agency Tapes
SUBA Ephemeris Routine
Orbit/GMT File
Indices File
Quality Check Listing
Ephem. Tape
B&L Routine
BSF File
GSF Routine
GSF File
Spectrometer Routine (Preprocess)
Photometer Routine (Preprocess)
CCG/PFA Routines
Zonal Average Routine
Spect. Data Base
Photom. Data Base
CCG/PFA Data Base
Exp. Plots
Exp. Listings
Zonal Average Displays
Spect/Photom Analysis Routines
CCG/PFA Analysis Routines
Zonal Average Listings
Analysis Plots
Analysis Listings
Analysis Listings
Analysis Plots

Figure 1

and CCG data; the third will contain the ROCA data. These tapes will be 9 track written at 1600bpi. The term used to describe these tapes is the Agency Tape (AT).

Each orbit on the AT will have four types of records; header record, scan record, event record and telemetry records. The header record contains information specific to the vehicle and orbit such as orbit number, date of orbit, GMT at the start and end of the pass and telemetry format type (A or C). The scan record will contain information pertaining to areas of digitization dropout. The event record is specific to each agency tape type. It may contain information from the telemetry stream obtained in the first pass of the 2 pass digitization system. For example, the event record for the CCG and PFA may contain the times at which the extendable baffle is deployed. The telemetry records will contain only the parameters designated for insertion into the agency tape data stream.

Each telemetry record contains masterframes of data with each masterframe starting at the mainframe containing subcommutator frame 1. By storing masterframes, as opposed to mainframes, in each physical record, a maximum of information may be stored on each magnetic tape. Further, by storing each masterframe in a consistent manner (starting at subcommutator level zero), the necessity of searching each file to find word locations of subcommutated data is removed.

When a complete tape recorder playback requires several station contacts, individual agency files will be received for each contact. Some data dropout between files is anticipated.

Upon receipt of the AT and associated data products at AFGL/SUWA, the tapes will be logged in and a tape copy will be made while a readability quality check is performed.

Formats of the individual agency tapes are contained in the appendix.

Tracking data is received at AFGL/SUWA and this data is input to the SUWA ephemeris routines and coverage for each one month period (in 60 second increments) is generated on an output file. Parameters included on this file are altitude, longitude, geocentric latitude, geodetic latitude, velocity and local time.

The ephemeris file is the basic input to the B&L program.

Another input to the B&L program is the orbit/GMT file which is a card image file containing the times and dates for which tape recorded data is acquired. By use of this file, the size of the magnetic parameter file is minimized by having ephemeris and magnetic information only during instrument "on" times.

In order to create the magnetic parameter file, called the B&L file, an existing routine was modified for use with this satellite. The modified routine, called the B&L program, uses as input the monthly ephemeris file and pertinent parameters from the Orbit/GMT file to create a B&L file for the prime data of each orbit. One B&L tape is created for each month of the lifetime of the satellites. Among the quantities stored on the B&L file for each orbit are all pertinent ephemeris parameters, magnetic field components, total field, L-Shell and geomagnetic longitude, latitude and local time. Data occurs at 60 second increments for each pass.

As Geophysical indices such as K_p, F10.7 CM solar flux and Ap are received, they are inserted into the INDICES file. Parameters contained on this file are essential to the computation of the neutral atmospheric model.

The INDICES file and the B&L file are input to the model atmosphere routine and the resulting file is called the Geophysical Support File (GSF). This file is identical in structure to the B&L file. Vacant words on the B&L file are filled on the GSF with such model parameters as temperature, pressure, mass density and constituent densities for O, O_2, N_2, H_e, H and A_r.

Pre-processing routines will input the agency tapes and either the B&L or GSF files. From these routines, plots and listings are generated as required and a data base is created. Processing routines are required for the spectrometer, photometer, PFA and CCG.

Zonal average routines will access the spectrometer data base.

Analysis routines are required and these routines will access the appropriate data bases and generate listings and plots to specifications.

3.3 Payloads and Processing Requirements

In this section a brief description of each payload and the associated telemetry is included. In addition, an overview of the requirements for the PFA, CCG, photometer and spectrometer are described.

3.3.1 Cold Cathode Gauge (CCG)-CRL 737

The CCG provides direct measurements of atmospheric neutral density. The CCG consists of two packages, a sensor and an electronic unit. The sensor houses the ionization gauge, magnet, thermistor circuitry, high voltage circuits, baffle motor, baffle operating circuits, magnetic shield and sensor decapping mechanism. The electronics unit contains the low voltage power supplied, converters, filters and signal measurement and calibration circuits.

The CCG ionization gauge monitors the internal gas density which can, in turn, be related to ambient atmospheric density.

The baffle extension is expected to give design criteria for future applications which include atmospheric temperature, atmospheric winds and velocity vector orientation. Baffle operation goes through a complete extension and retraction cycle whenever initiated. Operation of the probe during retraction is the primary mode.

The CCG outputs are as follows:

DESIG	DESC.	BITS	FORMAT A MF	RATE	FORMAT C MF	RATE
K205	Range	8	105	33	59	66
K206	Current	8	27,87	66	38,78,118	200
K207	HV	8	84	33	19	66
K208	Electronics Temp	8	17	33	99	66
K209	Baffle Status	8	81	33	79	66
K222	Gauge Temp.	4	65(4MSBS)	33	119(4MSBS)	66
K232	Gauge Open/Closed	1	21(Bit 2)	33	89(Bit 2)	66

3.3.2 Particle Flux Accumulator (PFA) - CRL 737

The PFA directly measures atmospheric neutral density and its spatial and temporal variations.

The PFA consists of a sensor, electronics unit and extendable baffle.

The sensor is an ionization gauge which measures internal gas pressure which can be related to ambient atmospheric density.

The baffle mechanism is expected to yield design criteria for future applications such as atmospheric temperature, winds and aspect relative to the velocity vector. The baffle will be fully extended, then retracted each time the baffle sequence is initiated. Primary data shall occur during retraction.

The PFA outputs are as follows:

DESIG	DESC.	BITS	FORMAT A MF	RATE	FORMAT C MF	RATE
K201	Density Data	8	67	33	28,68,108	200
K202	Electronics Temp.	8	91	33	44	66
K203	Sensor HV	8	101	33	84	66
K204	Baffle Status	8	111	33	10	66
K211	Range	8	57	33	11,71	133
K221	Sensor Temp.	4	106(4LSBS)	33	29(4LSBS)	66
K231	Gauge Open/Closed	1	21(Bit 1)	33	89 (Bit 2)	66

3.3.3 CCG/PFA Analysis Overview

Both of these instruments provide atmospheric neutral density measurements. Density determinations will result from the mapping of telemetry data into the current domain and from the current domain density parameters will be derived. A geophysical unit data base will be created which will contain the density parameters and selected magnetic, model and ephemeris data. Displays of density as a function of GMT with annotation for positional parameters will be produced.

3.3.4 Spectrometer Payload - CRL 726

The spectrometer has an ultraviolet unit and a vacuum ultraviolet unit. Photomultiplier tubes are used as detectors and both ranges are scanned simultaneously by diffraction gratings rotating on a shaft common to both units. Background intensity is obtained as a function of wavelength. Resolution and sensitivity are controlled by selecting one combination from a group

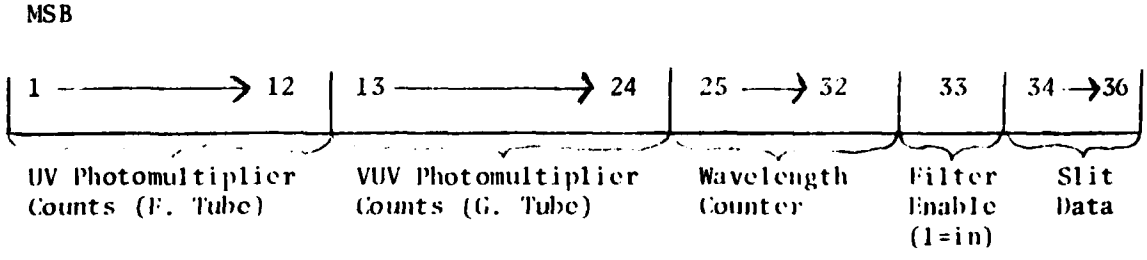
The range estimates and detectors are as follows:

RANGE	WAVELENGTHS (Approx)	DETECTOR
VUV	1070 → 1930A	G
UV	1610 → 2900A	F

A total range of 4000 steps is required to cover the spectrum. There is a 5 MS counting period at each step. This scanning occurs whenever the spectrometer is on. The filter was not included in the spectrometer as flown and all references to it should be diregarded.

DESIG	DESC.	BITS	FORMAT A MF	RATE	FORMAT C MF	RATE
K101	Spectrometer G. Tube Temp	8	11	33	8	66
K103	Spectrometer F. Tube HV	8	31	33	51	66
K104	Spectrometer G. Tube HV	8	41	33	48	66
K106	Spectrometer +5V Logic	8	7	33	41	66
K121	Spectrometer F. Tube Temp	4	66 (4MSB'S)	33	39 (4MSB'S)	66
K123	Spectrometer Power Supply Temp	4	106 (4MSB'S)	33	29 (4MSB'S)	66
K140-K144	Spectrometer Data	36	12,32, 52,72, 92,112	200	20,60, 100	2

K140 - The 36 bit serial-digital data is expressed as follows:



3.3.5 Spectrometer Analysis Overview

A preprocess data base for the spectrometer will be created. Key features of the preprocess file will be the accurate determination of wavelength and the structuring of records by scan. Ephemeris and magnetic parameters will also be tagged to the preprocess files. Thus, the preprocess file will provide structured data sets which allow for easy input to further analysis routines. Separate data bases will be created for format A and format C operations.

Outputs from the preprocess routine will include microfiche displays of averaged spectra; time histories of fixed wavelength data; and summed counts at sets of discrete wavelengths as well as over wavelength bands.

Zonal average spectra will be produced from a routine which will access the preprocess file. Basically, several sets of magnetic and ephemeris constraints will be applied to the satellite position and all spectra falling within the various constraint sets will be averaged. Thus, average spectra will be produced for zones defined to provide midday background, night tropical airglow, night aurora (north and south) and day aurora (north and south).

3.3.6 Photometer Payload

This instrument uses a photomultiplier as a detector over 4 broad wavelength ranges. The ranges are selectable. Field of view and associated sensitivity changes are provided by selecting one of four apertures. The photometer measures the intensity of the background and its spatial variation in a FOV approximating that required for missile detection applications. The counting period is 10_{MS}. Any of the 4 wavelengths and 4 apertures can be commanded. There is also an automatic filter change mode. The aperture will normally be set small during daytime and large at night.

APPENDIX A

S3-1 Ion Density Gauge Data
Base Format

vector. The perpendicular position provides instrument bias information which must be removed from the total acceleration.

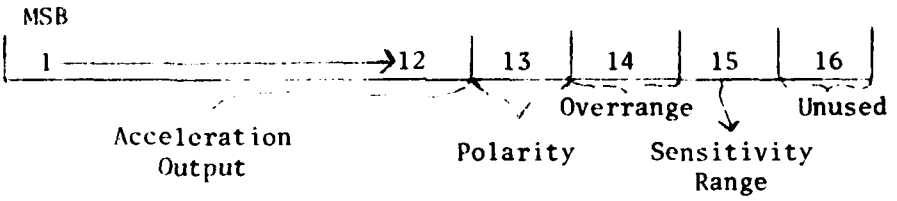
The ROCA will provide measurements down to 10^{-7}g. The instrument has 2 ranges (A and B). The probe turns on in range A (for approximately 20 secs) to allow centering of the proof mass then switches to its normal operating range (range B). High accelerations will cause overranging which result in the automatic change to range A for 20 seconds. It will then automatically return to range B for 2 seconds. This procedure continues automatically whenever overranging occurs. Sample time for the instrument is 25 seconds. The sensitive axis will be rotated to a position perpendicular to the velocity vector at selected intervals.

The ROCA Telemetry Words are as follows:

DESIG	DESC.	BITS	FORMAT A MF	RATE	FORMAT C MF	RATE
K210	Temperature	8	37	33	90	66
K223	Position Status	4	65(4LSBS)	33	119(4LSBS)	66
K240-K241	Acceleration Output	16	25/26 Subcom 1*	4	69/70 Subcom 1(**)	4

(*) Subcom is 8 words; (**) Subcom is 16 words

The ROCA 16 bit digital readout is decoded as follows:



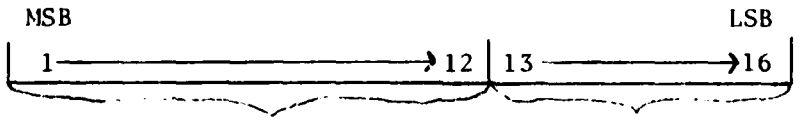
For the polarity bit, 0 = positive, 1 = negative if the polarity bit is negative, 4096 must be subtracted from the acceleration output and the sign changed to a negative.

The overrange bit is normally 0 but becomes 1 when the instrument is in overrange.

The sensitivity bit indicates instrument range: 0 = Range A; 1 = Range B.

DESIG	DESC.	BITS	FORMAT A MF	RATE	FORMAT C MF
K102	Photometer HV	8	97	33	31
K105	Photometer +5V Logic	8	51	33	91
K107	Photometer Detector Temp	8	71	33	111
K122	Photometer Power Supply Temp	4	66(4LSBS)	33	39(4LSBS)
K150-K151	Photometer VUV Data	16	5,45,85	100	49,109
K160-K161	Photometer Aperture/ Filter Status	16	82 Subcom 24	1	42 Subcom 24

K150 - The 16 bit serial-digital readout is expressed as follows:



Photometer Photomultiplier Counts (G. Tube Counts)

Unused

3.3.7 Photometer Analysis Overview

A preprocess data base for the photometer payload will be produced. This data base will be the prime input to further analysis routines. The inputs to the preprocess routine will consist primarily of the agency tape and the B&L/GSF file. In addition to the data base creation, the preprocess routine will produce average radiance listings and plots, a monitor synopsis, ephemeris and magnetic positional parameters and annotation for selected geophysical indices such as Kp and $F_{10.7}$ cm solar flux.

As with the spectrometer, separate data bases will be created for the format A and format C payload operations.

3.3.8 Rotating Calibration Accelerometer (ROCA) Payload

The ROCA is a single axis electrostatic accelerometer which may be rotated 90° (parallel or perpendicular to the velocity vector). The instrument measured aerodynamic drag accelerations which are directly proportional to atmospheric density. Normal operating position is parallel to the velocity

Data Base Storage: Ion Density Gauge

Header Record

0.1	Word Count (35)
0.2	Group Count (1)
1	Orbit No.
2	Month of orbit
3	Day of orbit
4	Year of orbit (last two digits of 19xx)
5	K_p for orbit
6	$F_{10.7}$ cm flux for orbit
7	Start time of orbit (GMT sec)
8	End time of orbit (GMT sec)
9	Start time of vehicle in sun
10	End time of vehicle in sun
11	Start time of vehicle in shade
12	End time of vehicle in shade
13	Perigee time (GMT sec)
14	Perigee altitude (km)
15	Perigee longitude (+E)
16	Perigee latitude
17	Local time of perigee (sec)
18	Electronics temperature (average)
19	Gauge temperature (representative value)
20	TGE (calculated Tg)

Data Base Storage: Ion Density Gauge (Cont.)

21 a_0 } Coefficients to least square fit for downleg

22 a_1 } where

23 a_2 }

$$\log_\rho = \sum_{i=o}^{4} a_i z^i - 15$$

24 a_3 }

25 a_4 } ρ = density; z = altitude $z \leq 350$ km

26 b_0 } Coefficients for up leg data fit

27 b_1 } Coefficients for up leg data fit

28 b_2 }

$$\log\rho = \sum_{i=o}^{4} b_i z^i - 15$$

29 b_3 }

30 b_4 } $z \leq 350$ km

31 Gauge Number {value = 4 for -4, -6, value = 5 for -5, -7}

32 Eccentricity

33 Inclination

34 $F_{10.7}$ flux (3 month average)

35 Vacant

Data Records - Ion Density Gauge Data Base

0.1	Word Count (21)
0.2	Group Count (24)
1	Time (ram) (GMT sec)
2	Altitude (km)
3	Longitude (+E)
4	Latitude (Geodetic)
5	Magnetic latitude
6	Local time (seconds)
7	I (current at 40° going into ram)
8	Pg (pressure at 40° going into ram)
9	R (S, D, α) (R factor at 40° going into ram)
10	I (current at 40° going out of ram)
11	Pg (pressure at 40° going out of ram)
12	R (S, D, α) (R factor at 40° out of ram)
13	Pressure into ram (from fit)
14	Pressure out of ram (from fit)
15	Average pressure (average of 13, 14 above)
16	Measured density ρ
17	Model density (J '71)
18	Model temperature (J '71)
19	Model pressure (J '71)
20	High Voltage
21	Vacant

Words 1-21 repeat 23 times

APPENDIX B

S3-1 MESA Accelerometer
Data Base Format

MESA Accelerometer Data Base

Header Record:

0.1	No. of words in header record (45)
0.2	Integer (1)
1	Satellite Name
2	Month of year at start of pass
3	Day of month at start of pass
4	Year (last 2 digits of 19xx)
5	Time at start of pass (GMT sec)
6	Time at end of pass (GMT sec)
7	Time of perigee (GMT sec)
8	Altitude at perigee (km)
9	Geocentric longitude at perigee (Degrees, +E)
10	Geodetic latitude at perigee
11	Local time of perigee (sec)
12	Start time of vehicle in sun (neg N/A)
13	End time of vehicle in sun (neg N/A)
14	Start time of vehicle in shade (neg N/A)
15	End time of vehicle in shade (neg N/A)
16	Start time of vehicle in sun_2 (neg N/A)
17	End time of vehicle in sun_2 (neg N/A)
18	Start time of vehicle in $shade_2$ (neg N/A)
19	End time of vehicle in $shade_2$ (neg N/A)
20	$F_{10.7}$ cm solar flux
21	$\bar{F}$ (3 month average)
22	K_p
23	Orbit Number
24	a_0
25	a_1
26	a_2
27	a_3
28	a_4

Downleg data coefficients to fit

$$15 + \log\rho = \sum_{i=0}^{4} a_i z^i$$

ρ = density, z - altitude

29	b_0	
30	b_1	Upleg data - coefficients to fit
31	b_2	$15 + \log\rho = \sum_{i=0}^{4} b_i z^i$
32	b_3	
33	b_4	
34	T_1	
35	C_1	Constants used in bias correcting data
36	T_2	
37	T_2	
38		Vacant
39		
40		
41		
42		
43		
44		
45		

MESA Accelerometer Output Data Base - Data Records

Output values are for ram points only

0.1	Number of words in a group (20)
0.2	Number of groups in a logical record (25)
1	Time (GMT seconds)
2	Altitude
3	Geodetic latitude
4	Geocentric longitude
5	Geomagnetic latitude
6	Geomagnetic longitude
7	Local time (sec)
8	Drag
9	ρ calculated
10	ρ model
11	Ratio (ρ meas/ρ model)
12	Attack Angle
13	L-Shell
14	Orbit normal angle
15	Temperature and bias corrected counts
16	Drag coefficient
17	Geocentric latitude
18	Vacant
19	Vacant
20	Vacant

The ram point outputs for the full pass comprise the first part of the MESA data base.

The second part of the data base is made up of points from the curve fit in 2 km intervals between 250 km and perigee. Perigee point is added.

The two portions of the file are separated by IND = 1, JGRP - 1, DATA = 0.0.

For the fitted data

0.1	Word Count (10)
0.2	Group Count (50)
1	GMT
2	ALT
3	Geodetic latitude
4	Geocentric longitude
5	Geomagnetic latitude
6	Geomagnetic longitude
7	ρ (from fit)
8	ρ model
9	Ratio
10	Local time

APPENDIX C

S3-1 MSI

Data Base Format

MSI Data Base - Header Record

0.1	Word Count (20)
0.2	Group Count (1)
1	Experiment (MSI)
2	Orbit Number
3	Month of Year
4	Day of month of orbit
5	Year (last two digits of 19xx)
6	Start time of orbit (GMT-sec)
7	End time of orbit (GMT-sec)
8	Start time of vehicle in sun-GMT sec (<0→N/A)
9	End time of vehicle in sun-GMT sec (<0→N/A)
10	Start time of vehicle in shade - GMT sec (<0→N/A)
11	End time of vehicle in shade - GMT sec (<0→N/A)
12	$\overline{R}$ (average R for orbit)
13	GMT (sec) of perigee
14	Altitude (km) of perigee
15	Longitude (+E) of perigee
16	Latitude of perigee
17	Local time of perigee (sec)
18	$\overline{T}$ (average sphere temp for orbit)
19	Vacant
20	Vacant

MSI Data Base Data Records

0.1	Word Count (50)
0.2	Group Count (10)
1	Time (GMT sec) ram
2	Altitude (km)
3	Geodetic latitude
4	Longitude
5	Invariant latitude
6	L-shell
7	Geomagnetic latitude
8	Magnetic local time (sec)
9	Velocity (km/sec)
10	I_{14} (current for mass 14)
11	α_{14} (attack angle of current for amu 14; + into ram, - out of ram)
12	I_{16}
13	α_{16}
14	I_{18}
15	α_{18}
16	I_{28}
17	α_{28}
18	I_{30}
19	α_{30}
20	I_{32}
21	α_{32}
22	I_{34}
23	α_{34}
24	I_{40}
25	α_{40}

MSI Data Base - Data Records (Cont.)

26	I_{44}
27	α_4
28	N_{16}
29	N_{28}
30	N_{40}
31	N_{14}
32	N_T ($N_T + \Sigma N_i$)
33	ρ ($\rho = k\Sigma N_i M_i$)
34	Time (sit mode 70° into ram) (T_{+70})
35	Altitude
36	α at T_{+70}
37	I_{28+70}
38	N_{28+70}
39	Time (sit - ram) (T_R)
40	Alt at T_R
41	α at T_R
42	$I_{28\ ram}$
43	$N_{28\ ram}$
44	Time (sit mode - 70° out of ram) (T_{-70})
45	Alt at T_{-70}
46	α at T_{-70}
47	I_{28-70}
48	N_{28-70}
49	Vacant
50	Vacant

APPENDIX D

S3-1 MSIV NII

Data Base Format

MSIV Neutral High (NH)

Header Record

0.1	Word Count (38)
0.2	Group Count (1)
1	Experiment (MSIV - NH)
2	Orbit Number
3	Month of year of orbit
4	Day of month of orbit
5	Year (last two digits of 19xx)
6	Start time of orbit (GMT sec)
7	End time of orbit (GMT sec)
8	Start time of vehicle in sun (<0 = >N/A)
9	End time of vehicle in sun (<0 = >N/A)
10	Start time of vehilce in shade (<0 = >N/A)
11	End time of vehicle in shade (<0 = >N/A)
12	GMT of perigee (sec)
13	Altitude of perigee (km)
14	Longitude (+E) of perigee
15	Geodetic latitude of perigee
16	Geomagnetic latitude of perigee
17	Invariant latitude of perigee
18	Local time of perigee
19	Magnetic local time of perigee
20	Corrected magnetic local time of perigee

MSIV Neutral High (NH) (Cont.)

21	Commutator 1	From first 8 frames of data in the pass
22	Commutator 2	
23	Commutator 3	
24	Commutator 4	
25	Commutator 5	
26	Commutator 6	
27	Commutator 7	
28	Commutator 8	
29	Commutator 1	From last 8 frames of data in the pass
30	Commutator 2	
31	Commutator 3	
32	Commutator 4	
33	Commutator 5	
34	Commutator 6	
35	Commutator 7	
36	Commutator 8	
37	Vacant	

Data Records - MSIV Neutral High Data Base

0.1	Word Count (72)
0.2	Group Count) ($\leq$7)
1	GMT at point closest to ram (sec)
2	Altitude
3	Geodetic
4	Longitude (+E)
5	Invariant latitude
6	L-shell
7	Geomagnetic latitude
8	Magnetic local time
9	Corrected magnetic local time
10	Velocity (km/sec)
11	Pitch Angle
12	T_1 ram
13	T_1 ram
14	T_1 wake
15	I_1 wake
16	T_2 ram
17	I_2 ram
18	T_2 wake
19	I_2 wake
20	T_4 ram
21	I_4 ram
22	T_4 wake
23	I_4 wake
24	T_{14} ram
25	I_{14} ram
26	T_{14} wake
27	I_{14} wake
28	T_{16} ram
29	I_{16} ram
30	T_{16} wake
31	I_{16} wake

32	T_{28} ram
33	I_{28} ram
34	T_{28} wake
35	I_{28} wake
36	T_{30} ram
37	I_{30} ram
38	T_{30} wake
39	I_{30} wake
40	T_{32} ram
41	I_{32} ram
42	T_{32} wake
43	I_{32} wake
44	T_{40} ram
45	I_{40} ram
46	T_{40} wake
47	I_{40} wake
48	T_{44} ram
49	I_{44} ram
50	T_{44} wake
51	I_{44} wake
52	α_1 of ram I_1 (+ = into ram; - = away from ram)
53	α_2 of ram I_2 (+ = into ram; - = away from ram)
54	α_4 of ram I_4 (+ = into ram; - = away from ram)
55	α_{14} of ram I_{14} (+ = into ram; - = away from ram)
56	α_{16} of ram I_{16} (+ = into ram; - = away from ram)
57	α_{28} of ram I_{28} (+ = into ram; - = away from ram)
58	α_{30} of ram I_{30} (+ = into ram; - = away from ram)
59	α_{32} of ram I_{32} (+ = into ram; - = away from ram)
60	α_{40} of ram I_{40} (+ = into ram; - = away from ram)
61	α_{44} of ram I_{44} (+ = into ram; - = away from ram)

Data Records - MSIV Neutral High Data Base (Cont.)

62	Ratio monitor 4
63	Ratio monitor 5
64	Ratio monitor 6
65	Ratio monitor 7
66	Ratio monitor 8
67	Beam monitor$_3$
68	Beam monitor$_4$
69	High Voltage Monitor
70	Vacant
71	Vacant
72	Vacant

APPENDIX E

S3-1 MSIV Ions

Data Base Format

MSIV Ion Data Base Header Record

0.1	Word Count (23)	
0.2	Group Count (1)	
1	Experiment (MSIV)	
2	Orbit Number	
3	Month of year of orbit	
4	Day of month of orbit	
5	Year (last 2 digits of 19xx)	
6	Start time of orbit (GMT-sec)	
7	End time of orbit (GMT-sec)	
8	Start time of vehicle in sun (<0→N/A)	
9	End time of vehicle in sun (<0→N/A)	
10	Start time of vehicle in shade (<0→N/A)	
11	End time of vehicle in shade (<0→N/A)	
12	GMT of perigee (sec)	
13	Altitude of perigee (km)	
14	Longitude (+E) of perigee	
15	Geodetic latitude of perigee	
16	Geomagnetic latitude of perigee	
17	Invariant latitude of perigee	
18	Local time of perigee	
19	Magnetic local time of perigee	
20	Corrected magnetic local time of perigee	
21	Commutator_1	
22	Commutator_2	
23	Commutator_3	from first 8 frames
24	Commutator_4	of data in pass
25	Commutator_5	
26	Commutator_6	
27	Commutator_7	
28	Commutator_8	

MSIV Ion Data Base Header Record (Cont.)

29	$Commutator_1$	
30	$Commutator_2$	
31	$Commutator_3$	
32	$Commutator_4$	From last 8 frames of data in pass
33	$Commutator_5$	
34	$Commutator_6$	
35	$Commutator_7$	
36	$Commutator_8$	
37	Vacant	
38	Vacant	

MSIV Ion Data Base Data Records

0.1	Word Count (39)
0.2	Group Count (13)
1	Time of start of selected frame (GMT seconds)
2	Altitude (km)
3	Geodetic latitude
4	Geomagnetic latitude
5	Invariant latitude
6	L-Shell
7	Longitude (+E)
8	Magnetic local time (sec)
9	Corrected magnetic local time (sec)
10	Local time (sec)
11	I_{14} (corrected to ram)
12	I_{16} (corrected to ram)
13	I_{28} (corrected to ram)
14	I_{30} (corrected to ram)
15	I_{32} (corrected to ram)
16	α_{14} at time of I_{14} (α = attack angle)
17	α_{16} at time of I_{16}
18	α_{28} at time of I_{28}
19	α_{30} at time of I_{30}
20	α_{32} at time of I_{32}
21	β_{14} at time of I_{14} (β = pitch angle)
22	β_{16} at time of I_{16}
23	β_{28} at time of I_{28}
24	β_{30} at time of I_{30}
25	β_{32} at time of I_{32}

MSIV Ion Data Base Data Records (Cont.)

26	ΣI_i (where I_i are corrected currents)
27	RA_1 (where RA has been translated to ram)
28	α_{RA_1}
29	RA_2 (translated to ram)
30	α_{RA_2}
31	RA_3 (translated to ram)
32	α_{RA_3}
33	TI_1
34	TI_2
35	TI_3
36	TI_4
37	Beam Monitor$_1$
38	Beam Monitor$_2$
39	High Voltage Monitor

APPENDIX F

S3-1
B&L File Format

B&L - File Header Record

0.1	Word Count	
0.2	Group Count (1)	
1	Satellite name	A
2	Modified Julian date at start of pass	F
3	Month of year at start of pass	F
4	Day of month at start of pass	F
5	Year (last two digits of 19xx)	F
6,7	Coefficients used in mag. field calculations	A
8	Epoch year of coefficients	F
9	Date coefficients initially updated to	F
10	Start time of pass (GMT) seconds	F
11	End time of pass (GMT) seconds	F
12	Time increment (seconds)	F
13	Indicator for magfield package 0. = INVAR/FIELDG, 1. = SHELLG/FELDG	F
14	Error value for INVAR	F
15	Semi-major axis (km)	F
16	Eccentricity	F
17	Inclination	F
18	Right ascension of ascending mode	F
19	Argument of perigee	F
20	Time of perigee (GMT) sec - neg → N/A	F
21	Altitude of perigee (km)	F

B&L - Header Record (Cont.)

22	Longitude of perigee (+E)
23	Latitude of Perigee (geodetic)
24	Local time of perigee - seconds
25	Time of apogee (neg → no apogee)
26	Altitude of apogee (km)
27	Longitude of apogee (+E)
28	Latitude of apogee (geodetic)
29	Local time of apogee - seconds
30	Start time of vehicle in sun_1 (neg → N/A)
31	End time of vehicle in sun_1 (neg → N/A)
32	Start time of vehicle in $shade_1$ (neg → N/A)
33	End time of vehicle in $shade_1$ (neg → N/A)
34	Start time of vehicle in sun_2 (neg → N/A)
35	End time of vehicle in sun_2 (neg → N/A)
36	Start time of vehicle in $shade_2$ (neg → N/A)
37	End time of vehicle in $shade_2$ (neg → N/A)
38	Longitude at start of pass
39	Longitude at end of pass
40	Latitude (geodetic) at start of pass
41	Latitude (geodetic) at end of pass
42	Altitude at start of pass
43	Altitude at end of pass
44	Rev no.
45-50	Vacant

B&L - File Data Records

0.1	Word count
0.2	Group count
1	Modified Julian Date
2	Calendar month
3	Calendar day
4	Calendar year
5	Hour of day
6	Minute of hour
7	Second of minute
8	GMT in seconds
9	x coordinate of position vector (km)
10	y coordinate of position vector (km)
11	z coordinate of position vector (km)
12	x coordinate of velocity vector (km/sec)
13	y coordinate of velocity vector (km/sec)
14	z coordinate of velocity vector (km/sec)
15	Satellite altitude (km)
16	Distance of satellite from center of earth (km)
17	Satellite velocity (km/sec)
18	Geocentric latitude (±90°)
19	Geodetic latitude (±90°)
20	Satellite longitude (+E)
21	Geomagnetic local time (seconds)
22	Local time (seconds)

B&L - File Data Records (Cont.)

23	x coordinate of magnetic field (geodetic) in gamma's
24	y coordinate of magnetic field (geodetic) in gamma's
25	z coordinate of magnetic field (geodetic) in gamma's
26	Geomagnetic coordinate - B
27	Geomagnetic coordinate - L
28	Geomagnetic latitude
29	Geomagnetic longitude
30	Magnetic inclination
31	Magnetic declination
32	Invariant latitude
33	Corrected geomagnetic latitude
34	Corrected geomagnetic longitude
35	Local corrected magnetic time
36	Solar zenith angle
37	Solar longitude
38	Solar right ascension
39	Solar declination
40	Mean anomaly
41-50	Vacant

APPENDIX G

S3-1 GSF Format

(GSF) Geophysical Support File Header Record

CDC	FORMAT	DESCRIPTION
0.1	I	Word count
0.2	I	Group count
1	A	Satellite name
2	F	Modified Julian date
3	F	Month of year at start of pass
4	F	Day of month at start of pass
5	F	Year of month at start of pass
6	F	Time at start of pass-GMT (Sec)
7	F	Time at end of pass-GMT (Sec)
8	F	Time increment
9	F	Semi Major axis at start of pass
10	F	Eccentricity at start of pass
11	F	Inclination at start of pass
12	F	Right ascension of ascending node
13	F	Argument of perigee
14	F	Time of perigee-GMT Sec (neg → N/A)
15	F	Altitude of perigee (km)
16	F	Longitude of perigee (+E)
17	F	Latitude (geodetic) of perigee
18	F	Local time of perigee (Sec)
19	F	Time of apogee-GMT Sec (neg → N/A)
20	F	Altitude of apogee (km)
21	F	Longitude of apogee (+E)

(GSF) Geophysical Support File Header Record (Cont.)

CDC	FORMAT	DESCRIPTION
22	F	Latitude of apogee (geodetic)
23	F	Local time of apogee (sec)
24	F	Start time of vehicle in sun_1 (neg → N/A)
25	F	End time of vehicle in sun_1 (neg → N/A)
26	F	Start time of vehicle in $shade_1$ (neg → N/A)
27	F	End time of vehicle in $shade_1$ (neg → N/A)
28	F	Start time of vehicle in sun_2 (neg → N/A)
29	F	End time of vehicle in sun_2 (neg → N/A)
30	F	Start time of vehicle in $shade_2$ (neg → N/A)
31	F	End time of vehicle in $shade_2$ (neg → N/A)
32	F	F10.7 cm solar flux ($F_{10.7}$)
33	F	F (3 month average)
34	F	K_p value
35	F	A_p value
36	F	Longitude (+E) at start of pass
37	F	Longitude (+E) at end of pass
38	F	Latitude (geodetic) at start of pass
39	F	Latitude (geodetic) at end of pass
40	F	Altitude at start of pass
41	F	Altitude at end of pass
42	F	Rev no. (f)
43-50	F	Vacant

Geophysical Support File Data Records

WORD NO.	FORMAT	DESCRIPTION
0.1	I	Word count
0.2	I	Group count
1	F	GMT (seconds)
2	F	Satellite altitude (km)
3	F	Geocentric latitude (±90°)
4	F	Geodetic latitude (±90°)
5	F	Longitude (+E)
6	F	Local time (seconds)
7	F	Geomagnetic latitude
8	F	Geomagnetic longitude
9	F	Model pressure
10	F	Model temperature (temp at atltitude)
11	F	Model density - N_2 (molecular N)
12	F	Model density - O_2 (molecular oxygen)
13	F	Model density - O (atmoic oxygen)
14	F	Model density - (gm/cm^3)
15	F	Exospheric temperature
16	F	Model density - H_e (Helium)
17	F	Model density - A_r (Argon)
18	F	Model density - H (Hydrogen)
19-25	Vacant	

APPENDIX H

S3-1 Data Base Summary Listing

(Sample)

G3-1 DATA BASE NOVEMBER 1974 05/22/80

REV		DATE	START TIME	STOP TIME	START TIME	STOP TIME	MESA TAPE/FILE		IDS TAPE/FILE		MSIV(IONS) TAPE/FILE		MSIV(NH) TAPE/FILE		MSI TAPE/FILE		KP
56	*	11/04/74	45278.	47355.	12133148	13109115			NO		OM		FILE		FOR THIS		0+
57	*	11/04/74	60346.	62473.	16145146	17121113			NO		OM		FILE		FOR THIS		1=
59	*	11/04/74	75463.	77972.	20157143	21139132	ME3660/	1	I023227	1	I03419/	1	N43472/	1	MI2266/	1	1-
61	*	11/05/74	4181.	6690.	01004141	01051130	ME3660/	2	I023227	2	I03419/	2	N43472/	2	MI2266/	2	1+
63	*	11/05/74	19299.	21358.	05101139	05155154	ME3660/	3	I023227	3	I03419/	3	N43472/	3	MI2266/	3	1
65	*	11/05/74	34416.	36475.	09133136	10107155	ME3660/	4	I023227	4	I03419/	4	N43472/	4	MI2266/	4	1
68	*	11/05/74	57034.	59150.	15151134	16075150	ME3660/	5	I023227	5	I03419/	5	N43472/	5	MI2266/	5	1-
70	*	11/05/74	72190.	74246.	20003110	20037126	ME3660/	6	I023227	6	I03419/	6	N43472/	6	MI2266/	6	2+
72	*	11/06/74	885.	2941.	00014145	00049101			NO		TAPE				FOR THIS		3
74	*	11/06/74	15980.	18036.	04026120	05000136			NO		OM		FILE		FOR THIS		3-
77	*	11/06/74	31026.	33131.	08013156	09017111	ME3660/	7	I023227	7	I03419/	7	N43472/	7	MI2266/	7	2-
78	*	11/06/74	46171.	48227.	12042131	13023147	ME3660/	8	I023227	8	I03419/	8	N43472/	8	MI2266/	8	3
80	*	11/06/74	61267.	63323.	17001107	17035123	ME3660/	9	I023227	9	I03419/	9	N43472/	9	MI2266/	9	2+
81	*	11/06/74	68815.	70871.	18004155	18041111	ME3660/	10	I023227	10	I03419/	10	N43472/	10	MI2266/	10	1-
83	*	11/06/74	83911.	85977.	22010131	22052157	ME3660/	11	I023227	11	I03419/	11	N43472/	11	MI2266/	11	1+
85	*	11/07/74	12606.	14662.	03030106	04004122	ME3660/	12	I023227	12	I03419/	12	N43472/	12	MI2266/	12	2+
87	*	11/07/74	27630.	29743.	07041130	08015141	ME3660/	13	I023227	13	I03419/	13	N43472/	13	MI2266/	13	2
89	*	11/07/74	42760.	44812.	11052140	12026152	ME3660/	14	I023227	14	I03419/	14	N43472/	14	MI2266/	14	1
91	*	11/07/74	57825.	59879.	16003148	16037159	ME3660/	15	I023227	15	I03419/	15	N43472/	15	MI2266/	15	2+
93	*	11/07/74	72891.	74943.	20014151	20049103	ME3660/	16	I023227	16	I03419/	16	N43472/	16	MI2266/	16	2+
95	*	11/08/74	1555.	3607.	00025155	01000107	ME3660/	17	I023227	17	I03419/	17	N43472/	17	MI2266/	17	2+
97	*	11/08/74	16623.	18675.	04032103	05011115	ME3660/	18	I023227	18	I03419/	18	N43472/	18	MI2266/	18	2-
99	*	11/08/74	31684.	33741.	08043103	09022121	ME3660/	19	I023227	19	I03419/	19	N43472/	19	MI2266/	19	1
100	*	11/08/74	33964.	41774.	11004102	11022154	ME3660/	20	I023227	20	I03419/	20	N43472/	20	MI2266/	20	1
101	*	11/08/74	46775.	48807.	12053135	13033127	ME3660/	21	I023227	21	I03419/	21	N43472/	21	MI2266/	21	3
103	*	11/08/74	51821.	63873.	17010121	17044133	ME3660/	22	I023227	22	I03419/	22	N43472/	22	MI2266/	22	3
105	*	11/08/74	76887.	78939.	21021127	21055133	ME3660/	23	I023227	23	I03419/	23	N43472/	23	MI2266/	23	5-
107	*	11/09/74	5563.	7603.	01032133	02006143	ME3660/	24	I023227	24	I03419/	24	N43472/	24	MI2266/	24	5+
109	*	11/09/74	13075.	15126.	03037155	04012104	ME3660/	25	I023227	25	I03419/	25	N43472/	25	MI2266/	25	5-
111	*	11/09/74	28537.	22645.	05043117	05077126	ME3660/	26	I023227	26	I03419/	26	N43472/	26	MI2266/	26	6-
110	*	11/09/74	28119.	30168.	07054133	08022143	ME3660/	27	I023227	27	I03419/	27	N43472/	27	MI2266/	27	5-
111	*	11/09/74	35641.	37690.	08054101	10028110	ME3660/	28	I023227	28	I03419/	28	N43472/	28	MI2266/	28	5-
112	*	11/09/74	43163.	45212.	11053123	12033132	ME3660/	29	I023227	29	I03419/	29	N43472/	29	MI2266/	29	5-
114	*	11/09/74	50685.	52734.	14064145	14038156	ME3660/	30	I023227	30	I03419/	30	N43472/	30	MI2266/	30	5-
116	*	11/09/74	58206.	61255.	16111106	16046115	ME3660/	31	I023227	31	I03419/	31	N43472/	31	MI2266/	31	4
117	*	11/09/74	65816.	67778.	18115156	18053138	ME3660/	32	I023227	32	I03419/	32	N43472/	32	MI2266/	32	2
119	*	11/09/74	73251.	75300.	20120151	20154100	ME3660/	33	I023227	33	I03419/	33	N43472/	33	MI2266/	33	2
117	*	11/09/74	80773.	82822.	22126113	23000122	ME3660/	34	I023227	34	I03419/	34	N43472/	34	MI2266/	34	2+
119	*	11/10/74	7416.	11465.	02136156	02111105	ME3660/	35	I023227	35	I03419/	35	N43472/	35	MI2266/	35	2+
120	*	11/10/74	15338.	19087.	06142118	06116127	ME3660/	36	I023227	36	I03419/	36	N43472/	36	MI2266/	36	3
121	*	11/10/74	31973.	34019.	08152153	09015151	ME3660/	37	I023227	37	I03419/	37	N43472/	37	MI2266/	37	1
123	*	11/10/74	39084.	41530.	10154106	11032117	ME3660/	38	I023227	38	I03419/	38	N43472/	38	MI2266/	38	1
124	*	11/10/74	46996.	49042.	13103116	13137127	ME3660/	39	I023227	39	I03419/	39	N43472/	39	MI2266/	39	1
125	*	11/10/74	54508.	56564.	15104128	15142134	ME3660/	40	I023227	40	I03419/	40	N43472/	40	MI2266/	40	2
127	*	11/11/74	69363.	71473.	19113123	20024133	ME3660/	41	I023227	41	I03419/	41	N43472/	41	MI2266/	41	2
131	*	11/11/74	11180.	15226.	03133140	04013146	ME3660/	42	I023227	42	I03419/	42	N43472/	42	MI2266/	42	3
133	*	11/11/74	28213.	31250.	07151103	07234110	ME3660/	43	I023227	43	I03419/	43	N43472/	43	MI2266/	43	3
135	*	11/11/74	43227.	45273.	11100127	12004133	ME3660/	44	I023227	44	I03419/	44	N43472/	44	MI2266/	44	5
137	*	11/11/74	53240.	60283.	14110140	14044147	ME3660/	45	I023227	45	I03419/	45	N43472/	45	MI2266/	45	7
139	*	11/11/74	65240.	67283.	17115140	18004151	ME3660/	46	I023227	46	I03419/	46	N43472/	46	MI2266/	46	6

APPENDIX I

S3-2 User File Formats

HEADER RECORD FOR DATA FILES OF VEHICLE S3-2

CDC Word	Information	Format
0.1	Word count (30)	I
0.2	Group count (1)	I
1	Vehicle (S3-2)	A
2	Experiment	A
3	Analog tape number	A
4	Orbit number	F
5	Date of orbit xx/xx/xx	A
6	Date STF tape generated (xx/xx/xy)	A
7	Date of creation of user file (xx/xx/xx)	A
8	Start time of data (GMT-SECS)	F
9	Starting altitude (km)	F
10	Code for starting altitude { 1. = increasing; 0. = decreasing }	F
11	Starting latitude	F
12	Code for starting latitude { 1. = increasing; 0. = decreasing }	F
13	End time of data (GMT-seconds)	F
14	Altitude at end of data	F
15	Latitude at end of data	F
16	Julian day (from STF)	I
17 18 19 20	STW1 GMT1 DGMT DSTW To calculate GMT from STW GMT = [GMT1 + (STW-STW1) DGMT/DSTW]/1000	I
21	Inclination of orbital plane	F
22	Right ascension of ascending node	F
23	Average counts for 21-2-4 (for counts > 3)	F
24	Average counts for 21-4-4 (for counts > 3)	F
25	Mode monitor for 22-7 MSIV	F
26 27 28 29 30	Vacant	

ION DENSITY GAUGE DATA RECORDS (S3-2)

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2-6	1-60	21-2-1	$Range_{1-5}$
5	7-11	1-60	21-2-1	Range 6-10
6	12-16	1-60	21-2-1	Range 11-15
7	17	1-12	21-2-1	$Range_{16}$
	18-21	13-60	21-2-2	$Gauge\ Current_{1-4}$
8	22-26	1-60	21-2-2	$Gauge\ Current_{5-9}$
9	27-31	1-60	21-2-2	$Gauge\ Current_{10-14}$
10	32-33	1-24	21-2-2	$Gauge\ Current_{15-16}$
	34	25-36	21-2-3	High Voltage
	35-36	37-60	21-4-1	$Gauge\ Current_{1-2}$
11	37-41	1-60	21-4-1	$Gauge\ Current_{3-7}$
12	42-46	1-60	21-4-1	$Gauge\ Current_{8-12}$
13	47-51	1-60	21-4-1	$Gauge\ Current_{13-17}$
14	52-56	1-60	21-4-1	$Gauge\ Current_{18-22}$
15	57-61	1-60	21-4-1	$Gauge\ Current_{23-27}$
16	62-66	1-60	21-4-1	$Gauge\ Current_{28-32}$
17	67-71	1-60	21-4-1	$Gauge\ Current_{33-37}$
18	72-76	1-60	21-4-1	$Gauge\ Current_{38-42}$
19	77-81	1-60	21-4-1	$Gauge\ Current_{43-47}$
20	82-86	1-60	21-4-1	$Gauge\ Current_{48-52}$
21	87-91	1-60	21-4-1	$Gauge\ Current_{53-57}$
22	92-96	1-60	21-4-1	$Gauge\ Current_{58-62}$
23	97,98	1-24	21-4-1	$Gauge\ Current_{63-64}$
	99-101	25-60	21-4-2	$Range_{1-3}$
24	102-106	1-60	21-4-2	$Range_{4-8}$
25	107-111	1-60	21-4-2	$Range_{9-13}$
26	112,114	1-36	21-4-2	$Range_{14-16}$
	115,116	37-60	21-4-3	$Filament\ Emission_{1-2}$

ION DENSITY GAUGE DATA RECORDS (S3-2) (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
27	117-121	1-60	21-4-3	Filament Emission$_{3-7}$
28	122	1-12	21-4-3	Filament Emission$_{8}$
	123	13-24	21-2-4	Electronic Temperature
	124	25-36	21-2-5	Gauge Temperature
	125	37-48	21-4-4	Electrometer Temperature
	126	49-60	21-4-5	Gauge Temperature
29	127	1-12	21-4-6	Gauge Open/Close

Words 3-29 repeat 17 times within a record (i.e., 18 seconds per record)

ATTITUDE/VEHICLE HISTORY (S3-2)

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2	1-60	A12	Earth Sensor Crossing Time (GMT)
5	3	1-60	A16	Sun Sensor - sun in FDV (GMT)
6	4	1-60	T15	Timer output zero time (GMT)
7	5-8	1-48	A1	P-Axis low_{1-4}
	9	49-60	A2	P-Axis $high_1$
8	10-12	1-36	A2	P-Axis $high_{2-4}$
	13-14	37-60	A3	Q-Axis low_{1-2}
9	15-16	1-24	A3	Q-Axis low_{3-4}
	17-19	25-60	A4	Q-Axis $high_{1-3}$
10	20	1-12	A4	Q-Axis $high_4$
	21-24	13-60	A5	R-Axis low_{1-4}
11	25-28	1-48	A6	R-Axis $high_{1-4}$
	29	49-60	A7	Magnetometer bias
12	30	1-12	A8	Spin Coil Current
	31	13-24	A17	Sun Sensor - solar aspect angle
	32	25-26	A18	Precession coil REG #1 magnitude
	33	37-48	A19	Precession coil REG #2 magnitude
	34	49-60	A27	Solar Aspect Angle - Fine #1
13	35	1-12	A28	Solar Aspect Angle - Fine #2
	36-39	13-60	T2,T3,T1	Command Word Replica
14	40	1-12	T8	Transmitter Temperature
	41	13-24	T9	Processor cal. low level
	42	25-36	T10	Processor cal. mid level
	43	37-48	T11	Processor cal. high level
	44	49-60	E1	Shunt limiter current
15	45	1-12	E2	Battery current
	46	13-24	E3	Main bus current
	47	25-36	E4	Main bus $voltage_1$
	48-49	37-60	E4	Main bus $voltage_{2-3}$

CDC Word	Data Word	Bits	Desig.	Description
16	50-54	1-60	E4	Main bus voltage$_{4-8}$
17	55-59	1-60	E4	Main bus voltage$_{9-13}$
18	60-62	1-36	E4	Main bus voltage$_{14-15}$
	63	37-48	E5	Battery Temperature
	64	49-60	E6	Battery state of charge
19	65	1-12	E7	Solar array PNL A804 temp.
	66	13-24	E8	Solar array PNL A805 temp.
	67	25-36	S1	Temperature No. 1
	68	37-48	S2	Temperature No. 2
	69	49-60	S3	Temperature No. 3
20	70	1	E9	Volt. limiter control state enabled
		2	A9	Precession coil timed polarity
		3	A10	Spin coil spin up/down
		4	A11	Precession coil high/low select
		5-6	A13	Earth Sensor polarity
		7	A22	Precession coil on/off
		8	A23	1/4 orbit torqueing selection
		9	A24	1/4 orbit torqueing selection
		10	A25	II & IV positive
		11	A26	I & III positive

Words 3-20 repeat 27 times per record (i.e., 28 seconds per record)

S3-2 EXPERIMENT 226-1 ›226-7 DATA RECORDS

CDC Word	Data Word	Bits	Desig.	Description
1	1	1-60		Word Count
2	2	1-60		Group Count
3	3	1-60		STW (28 bits-right adjusted)
4	4	1-12	26-7-1	E-Field 12_1 (X1)
	5-8	13-60	26-7-1	E-Field 12_{2-5}
5	9-13	1-60	26-7-1	E-Field 12_{6-10}
6	14-18	1-60	26-7-1	E-Field 12_{11-15}
7	19-23	1-60	26-7-1	E-Field 12_{16-20}
8	24-28	1-60	26-7-1	E-Field 12_{21-25}
9	29-33	1-60	26-7-1	E-Field 12_{26-30}
10	34-38	1-60	26-7-1	E-Field 12_{31-35}
11	39-43	1-60	26-7-1	E-Field 12_{36-40}
12	44-48	1-60	26-7-1	E-Field 12_{41-45}
13	49-53	1-60	26-7-1	E-Field 12_{46-50}
14	54-58	1-60	26-7-1	E-Field 12_{51-55}
15	59-63	1-60	26-7-1	E-Field 12_{56-60}
16	64-67	1-48	26-7-1	E-Field 12_{61-64}
	68	49-60	26-7-2	E-Field 34_1 (X1)
17	69-73	1-60	26-7-2	E-Field 34_{2-6}
18	74-78	1-60	26-7-2	E-Field 34_{7-11}
19	79-83	1-60	26-7-2	E-Field 34_{12-16}
20	84-88	1-60	26-7-2	E-Field 34_{17-21}
21	89-93	1-60	26-7-2	E-Field 34_{22-26}
22	94-98	1-60	26-7-2	E-Field 34_{27-31}
23	99	1-12	26-7-2	E-Field 34_{32}
	100-103	13-60	26-7-3	E-Field 56_{1-4} (X1)
24	104-108	1-60	26-7-3	E-Field 56_{5-9}
25	109-113	1-60	26-7-3	E-Field 56_{10-14}
26	114-118	1-60	26-7-3	E-Field 56_{15-19}
27	119-123	1-60	26-7-3	E-Field 56_{20-24}
28	124-128	1-60	26-7-3	E-Field 56_{25-29}
29	129-131	1-36	26-7-3	E-Field 56_{30-32}
	132-133	37-60	26-7-4	E-Field 12_{1-2} (X10)

CDC Word	Data Word	Bits	Desig.	Description
30	134-138	1-60		E-Field 12_{3-7}
31	139-143	1-60		E-Field 12_{8-12}
32	144-148	1-60		E-Field 12_{13-17}
33	149-153	1-60		E-Field 12_{18-22}
34	154-158	1-60	26-7-4	E-Field 12_{23-27} (X10)
35	159-163	1-60	26-7-4	E-Field 12_{28-32}
36	164-168	1-60	26-7-5	E-Field 34_{1-5} (X10)
37	169-173	1-60	26-7-5	E-Field 34_{6-10}
38	174-178	1-60	26-7-5	E-Field 34_{11-15}
39	179-183	1-60	26-7-5	E-Field 34_{16-20}
40	184-188	1-60	26-7-5	E-Field 34_{21-25}
41	189-193	1-60	26-7-5	E-Field 34_{26-30}
42	194-195	1-24	26-7-5	E-Field 34_{31-32}
	196-198	25-60	26-7-6	E-Field 56_{1-3} (X10)
43	199-203	1-60	26-7-6	E-Field 56_{4-8}
44	204-208	1-60	26-7-6	E-Field 56_{9-13}
45	209-213	1-60	26-7-6	E-Field 56_{14-18}
46	214-218	1-60	26-7-6	E-Field 56_{19-23}
47	219-223	1-60	26-7-6	E-Field 56_{24-28}
48	224-227	1-48	26-7-6	E-Field 56_{29-32}
	228	49-60	26-7-19	Length-1
49	229	1-12	26-7-20	Length-2
	230	13-24	26-7-21	Length-3
	231	25-36	26-7-22	Length-4
	232	37-48	26-7-23	Length-5
	233	49-60	26-7-24	Length-6
50	234	1-12	26-7-25	Limit-1
	235	13-24	26-7-26	Limit-2
	236	25-36	26-7-27	Limit-3
	237	37-48	26-7-28	Limit-4
	238	49-60	26-7-29	Limit-5
51	239	1-12	26-7-30	Limit-6
	240-243	13-60	A1	P Axis-Lo_{1-4}

S3-2 EXPERIMENT 226-1 226-7 DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
52	244-247	1-48	A2	P Axis-Hi_{1-4}
	248	49-60	A3	Q Axis-Lo_1
53	249-251	1-36	A3	Q Axis-Lo_{2-4}
	252-253	37-60	A4	Q Axis Hi_{1-2}
54	254-255	1-24	A4	Q Axis Hi_{3-4}
	256-258	25-60	A5	R Axis Lo_{1-3}
55	259	1-12		R Axis Lo_4
	260-263	13-60	A6	R-Axis Hi_{1-4}
56	264	1-12	A7	Magnetometer Bias
56	265	13-24	$ANSC5_4$	
	266	25-36	$ANSC9_2$	
	267	37-48	$ANSC9_{10}$	
	268	49-60		Vacant - Zero Fill

Words 3-56 repeat 8 times per record (i.e., 9 seconds of data per record)

$ANSC5_4$ Words	$ANSC9_2$ Words	$ANSC9_{10}$ Words
26-7-11	21-4-5	26-7-13
26-7-12	21-4-6	26-7-14
24-4-1	34-10	26-7-15
24-4-2	26-7-7	26-7-16
24-4-3	26-7-8	26-7-17
24-4-4	23-2	26-7-18
24-4-5	23-3	
24-4-6	23-4	
24-4-7	24-2-1	
24-4-8	24-2-2	
24-4-9	24-2-3	
24-4-10	24-2-4	
24-5-1	24-2-5	
24-5-2	24-2-6	
24-5-3	26-7-9	
24-5-4	26-7-10	

SS-2 EXPERIMENT 224-1 DATA RECORDS

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word Count (37)
2	0.2	1-60		Group Count (≤13)
3	1	1-60		STW
4	2-3	1-24	24-2-11	Proton Flux Measurement$_1$
	4-5	24-48	24-2-11	Proton Flux Measurement$_2$
	6	49-60	24-2-11	Proton Flux Measurement
5	7	1-12	24-2-11	Proton Flux Measurement$_3$
	8-11	13-60	24-2-11	Proton Flux Measurement$_{4-5}$
6	72-15	1-48	24-2-11	Proton Flux Measurement$_{6-7}$
	16	49-60		
7	17	1-12	24-2-11	Proton Flux Measurement$_8$
	18-21	13-60	24-2-11	Proton Flux Measurement$_{9-10}$
8	22-25	1-48	24-2-11	Proton Flux Measurement$_{11-12}$
	26	49-60	24-4-11	200m LLTH
9	27	1-12	24-4-12	200m ULTH
	28	13-24	24-4-13	750 LLTH
	29	25-36	24-4-14	750 ULTH
	30	37-60		
10	32-34	1-36	24-4-15	Proton & Alpha Particle Fluxes Measure.
	35-36	37-60	24-5-21	Digital No. 1_1
11	37-38	1-24		
	39-41	25-60	24-5-21	Digital No. 1_2
12	42	1-12		
	43-46	13-60	24-5-21	Digital No. 1_3
13	47-50	1-48	24-5-21	Digital No. 1_4
		49-60		
14	51-54	1-36	24-5-21	Digital No. 1_5
	55-56	37-60		
15	57-58	1-24	24-5-21	Digital No. 1_6
	59-61	25-60		
16	62	1-12	24-5-21	Digital No. 1_7
	63-66	13-60	24-5-21	Digital No. 1_8

S3-2 EXPERIMENT 224-1 DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
17	67-70	1-48	24-5-21	Digital No. l_9
	71	49-60		
18	72-74	1-36	24-5-21	Digital No. l_{10}
	75-76	37-60		
19	77-78	1-24	24-5-21	Digital No. l_{11}
	89-81	25-69		
20	82	1-12	24-5-21	Digital No. l_{12}
	83-86	13-60		
21	87-90	1-48	24-5-21	Digital No. l_{14}
	91	49-60		
22	92-84	1-36	24-5-21	Digital No. l_{15}
	95-96	37-60		
23	97-98	1-24	24-5-21	Digital No. l_{16}
	99-100	25-48	24-5-22	Digital No. 2_1
		49-60		
24	101-102	1-12	24-5-22	Digital No. 2_2
	103-106	13-60	24-5-22	Digital No. 2_{3-4}
25	107-110	1-48	24-5-22	Digital No. 2_{5-6}
		49-60		
26	111-112	1-12	24-5-22	Digital No. 2_7
	113-116	13-60	24-5-22	Digital No. 2_{8-9}
27	117-118	1-24	24-5-22	Digital No. 2_{10}
	119-121	25-60	A1	P-Axis Low_{1-3}
28	122	1-12	A1	P-Axis Low_4
	123-126	13-60	A2	P-Axis $High_{1-4}$
29	127-130	1-48	A3	Q-Axis Low_{1-4}
	131	49-60	A4	Q-Axis $High_1$
30	132-134	1-36	A4	Q-Axis $High_{2-4}$
	135-136	37-60	A5	R-Axis Low_{1-2}
31	137-138	1-24	A5	R-Axis Low_{3-4}
	139-141	25-60	A6	R-Axis $High_{1-3}$
32	142	1-12	A6	R-Axis $High_4$
	143	13-24	A7	Magnetometer Bias

S5-2 EXPERIMENT 224-1 DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
	144	25-36	24-2-1	+100 v Det. Mon.
	145	37-48	24-2-2	+15 v Preamp. Mon.
	146	49-60	24-2-3	+5 v Mon.
33	147	1-12	24-2-4	+2.5 v Mon.
	148	13-24	24-2-5	+1.0 v Mon.
	149	25-36	24-2-6	-2.5 v Mon.
	150	37-48	24-4-1	5.0 v Ref.
	151	49-60	24-4-2	2.5 v Ref.
34	152	1-12	24-4-3	0.0 v Ref.
	153	13-24	24-4-4	28 v Mon.
	154	25-36	24-4-5	+15 v Mon.
	155	37-48	24-4-6	+5v Mon.
	156	49-60	24-4-7	-5v Mon.
35	157	1-12	24-4-8	Bias Mon.
	158	13-24	24-4-9	Elec. Temp.
	159	25-36	24-4-10	Detector Temp.
	160	37-48	24-5-1	Magnetometer No. 1
	161	49-60	24-5-2	Magnetometer No. 2
36	162	1-12	24-5-3	Magnetometer No. 3
	163	13-24	24-5-4	Magnetometer No. 4
	164	25-36	24-5-5	Magnetometer No. 5
	165	37-48	24-5-6	Magnetometer No. 6
	166	49-60	24-5-7	Magnetometer No. 7
37	167	1-12	24-5-8	Magnetometer No. 8
	168	13-24	24-5-7	Magnetometer No. 9
	169	25-36	24-5-10	Magnetometer No. 10
	170	37-48	24-5-11	Magnetometer No. 11
	171	49-60	24-5-12	Magnetometer No. 12
38	172	1-12	24-5-13	Magnetometer No. 13
	173	13-24	24-5-14	Magnetometer No. 14
	174	25-36	24-5-15	Magnetometer No. 15
	175	37-48	24-5-16	Magnetometer No. 16
	176	49-60	24-5-17	Magnetometer No. 17

S3-2 EXPERIMENT 224-1 DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
39	177	1-12	24-5-18	Magnetometer No. 18
	178	13-24	24-5-19	Magnetometer No. 19
	179	25-36	24-5-20	Magnetometer No. 20
	180-181	37-60		Vacant

Words (3-39) repeat 12 times within a record (i.e., 13 seconds per record)

S3-2 EXPERIMENT 219-1, -2, -3, -3A DATA RECORDS

CDC Word	Data Word	Bits	Desig.	Information
1	1	1-60		Word Count
2	2	1-60		Group Count
3	3	1-60		Satellite Clock (at SC 0)
4	4	1-12	19-3-13	ES_1
4	5	13-24		ES_2
4	6	25-36		ES_3
4	7	37-48		ES_4
4	8	49-60		ES_5
5,6	9-18	1-60		ES_6 - ES_{15}
7	19	1-12		ES_{16}
7	20	13-24	19-3-14	Range A_1
7	21	25-36		Range A_2
7	22	37-48		Range A_3
7	23	49-60		Range A_4
8-12	24-48	1-60		Range A_5 - A_{29}
13	49-51	1-36		Range A_{30} - A_{32}
13	52	37-48	19-3-15	Range B_1
13	53	49-60		Range B_2
14-19	54-83	1-60		Range B_3 - B_{32}
20-25	84-113	1-60	19-3-17	$R24_1$ - $R24_{30}$
26	114	1-12		$R24_{31}$
26	115	13-24		$R24_{32}$
26	116-118	25-60	19-3-16	$R68_1$ - $R68_3$
27-31	119-143	1-60		$R68_4$ - $R68_{28}$
32	144-147	1-48		$R68_{29}$ - $R68_{32}$
32	148	49-60	19-3-11	$R21_1$
33-35	149-163	1-60		$R21_2$ - $R21_{16}$
36-38	164-178	1-60	19-3-12	$R23_1$ - $R23_{15}$
39	179	1-12		$R23_{16}$
39	180-183	13-60	19-3-9	$R65_1$ - $R65_4$
40-41	184-193	1-60		$R65_5$ - $R65_{14}$

S3-2 EXPERIMENT 219-1, -2, -3, -3A DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Information
42	194-195	1-24		$R65_{15}$ - $R65_{16}$
42	196-198	25-60	19-3-10	$R67_1$ - $R67_3$
43-44	199-208	1-60		$R67_4$ - $R67_{13}$
45	209-211	1-36		$R67_{14}$ - $R67_{16}$
45	212-213	37-60	19-3-5	$I1_1$ - $I1_2$
46-47	214-223	1-60		$I1_3$ - $I1_{12}$
48	224-227	1-48		$I1_{13}$ - $I1_{16}$
48	228	49-60	19-3-6	$I2_1$
49-51	229-243	1-60		$I2_2$ - $I2_{16}$
52-54	244-258	1-60	19-3-7	$I3_1$ - $I3_{15}$
55	259	1-12		$I3_{16}$
55	260-263	13-60	19-3-8	$I4_1$ - $I4_4$
56-57	264-273	1-60		$I4_5$ - $I4_{14}$
58	274-275	1-24		$I4_{15}$ - $I4_{16}$
58	276-278	25-60	19-3-1	$I5_1$ - $I5_3$
59-60	279-288	1-60		$I5_4$ - $I5_{13}$
61	289-291	1-36		$I5_{14}$ - $I5_{16}$
61	292-293	37-60	19-3-2	$I6_1$ - $I6_2$
62-63	294-303	1-60		$I6_3$ - $I6_{12}$
64	304-307	1-48		$I6_{13}$ - $I6_{16}$
64	308	49-60	19-3-3	$I7_1$
65-67	309-323	1-60		$I7_2$ - $I7_{16}$
68-70	324-338	1-60	19-3-4	$I8_1$ - $I8_{15}$
71	339	1-12		$I8_{16}$
71	340-343	13-60	19-3-22	$T12_1$ - $T12_4$
72	344-347	1-48		$T12_5$ - $T12_8$
72	348	49-60		ANSSC1

Words 3-72 repeat 6 times within a record (i.e., 7 seconds per record)

S3-2 PIEZOELECTRIC ACCELEROMETER DATA RECORDS

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2-5	1-48	34-1	X2 $Signal_{1-4}$
	6	49-60	34-2	X3 Signal
5	7	1-12	34-3	X1 Signal
	8	13-24	34-4	Y3 Signal
	9	25-36	34-5	Y2 Signal
	10	37-48	34-6	Y1 Signal
	11	49-60	34-7	Z3 Signal
6	12	1-12	34-8	Z2 Signal
	13	13-24	34-9	Z1 Signal
	14	25-36	34-10	Temperature Monitor
		37-60		Vacant

Words 3-6 repeat 126 times within a record (i.e., 127 seconds per record)

MSIV DATA RECORDS - S3-2

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60	T4	Satellite Time Word
4	2-5	1-48	22-15	$Spectra_{1-2}$
4		49-60		
5	6-7	1-12	22-15	$Spectra_{3}$
	8-11	13-60	22-15	$Spectra_{4-5}$
6	12-15	1-48	22-15	$Spectra_{6-7}$
6		49-60		
7	16-17	1-12	22-15	$Spectra_{8}$
	18-21	13-60	22-15	$Spectra_{9-10}$
8	22-25	1-48	22-15	$Spectra_{11-12}$
8		49-60		
9	26-27	1-12	22-15	$Spectra_{13}$
	28-31	13-60	22-15	$Spectra_{14-15}$
10	32-35	1-48	22-15	$Spectra_{16-17}$
10		49-60		
11	36-37	1-12	22-15	$Spectra_{18}$
	38-41	13-60	22-15	$Spectra_{19-20}$
12	42-45	1-48	22-15	$Spectra_{21-22}$
12		49-60		
13	46-47	1-12	22-15	$Spectra_{23}$
	48-51	13-60	22-15	$Spectra_{24-25}$
14	52-55	1-48	22-15	$Spectra_{26-27}$
14		49-60		
15	56-59	1-12	22-15	$Spectra_{28}$
	58-61	13-60	22-15	$Spectra_{29-30}$
16	62-65	1-48	22-15	$Spectra_{31-32}$
16		49-60		
17	66-67	1-12	22-15	$Spectra_{33}$
	68-71	13-60	22-15	$Spectra_{34-35}$
18	72-75	1-48	22-15	$Spectra_{36-37}$

MSFC DATA RECORDS - S3-2 (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
18		49-60		
19	76-77	1-12	22-15	$Spectra_{38}$
	78-81	13-60	22-15	$Spectra_{39-40}$
20	82-85	1-48	22-15	$Spectra_{41-42}$
20		49-60		
21	86-87	1-12	22-15	$Spectra_{43}$
	88-91	13-60	22-15	$Spectra_{44-45}$
22	92-95	1-48	22-15	$Spectra_{46-47}$
22		49-60		
23	96-97	1-12	22-15	$Spectra_{48}$
	98-101	13-60	22-15	$Spectra_{49-50}$
24	102-105	1-48	22-15	$Spectra_{51-52}$
24		49-60		
25	106-107	1-12	22-15	$Spectra_{53}$
	108-111	13-60	22-15	$Spectra_{54-55}$
26	112-115	1-48	22-15	$Spectra_{56-57}$
26		49-60		
27	116-117	1-12	22-15	$Spectra_{58}$
	118-121	13-60	22-15	$Spectra_{59-60}$
28	122-125	1-48	22-15	$Spectra_{61-62}$
28		49-60		
29	126-127	1-12	22-15	$Spectra_{63}$
	128-129	13-36	22-15	$Spectra_{64}$
	130-131	37-60	22-1	RF_{1-2}
30	132-136	1-60	22-1	RF_{3-7}
31	137-141	1-60	22-1	RF_{8-12}
32	142-146	1-60	22-1	RF_{13-17}
33	147-151	1-60	22-1	RF_{18-22}
34	152-156	1-60	22-1	RF_{23-27}
35	157-161	1-60	22-1	RF_{28-32}
36	162-166	1-60	22-1	RF_{33-37}
37	167-171	1-60	22-1	RF_{38-42}
38	172-176	1-60	22-1	RF_{43-47}
39	177-181	1-60	22-1	RF_{48-52}

MSIV DATA RECORDS - S3-2 (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
40	182-186	1-60	22-1	RF_{53-57}
41	187-191	1-60	22-1	RF_{58-62}
42	192-193	1-24	22-1	RF_{63-64}
	194-196	25-60	22-4	VR_{1-3}
43	197-201	1-60	22-4	VR_{4-8}
44	202-206	1-60	22-3	$Ratio_{1-5}$
45	207-209	1-36	22-3	$Ratio_{6-8}$
	210-211	37-60	22-5	DC_{1-2}
46	212-216	1-60	22-5	DC_{3-7}
47	217	1-12	22-5	DC_{8}
	218-221	13-60	22-2	$Beam_{1-4}$
48	222	1-12	22-6	Commutator
	223	13-24	22-7	Mode Monitor
	224-225	25-48	22-8	HV $Monitor_{1-2}$
	226	49-60		Vacant

Words 3-48 repeat 11 times within a record (i.e., 11 seconds per record)

SS-2 FLUXGATE DATA RECORDS

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2	1-60	T15	T15
5	3-7	1-60	26-10-1	X-Axis Magnetometer$_{1-5}$
6	8-12	1-60	26-10-1	X-Axis Magnetometer$_{6-10}$
7	13-17	1-60	26-10-1	X-Axis Magnetometer$_{11-15}$
8	18-22	1-60	26-10-1	X-Axis Magnetometer$_{16-20}$
9	23-27	1-60	26-10-1	X-Axis Magnetometer$_{21-25}$
10	28-32	1-60	26-10-1	X-Axis Magnetometer$_{26-30}$
11	33-34	1-24	26-10-1	X-Axis Magnetometer$_{31-32}$
	35-37	25-60	26-10-2	Y-Axis Magnetometer$_{1-3}$
12	38-42	1-60	26-10-2	Y-Axis Magnetometer$_{4-8}$
13	43-47	1-60	26-10-2	Y-Axis Magnetometer$_{9-13}$
14	48-52	1-60	26-10-2	Y-Axis Magnetometer$_{14-18}$
15	53-57	1-60	26-10-2	Y-Axis Magnetometer$_{19-23}$
16	58-62	1-60	26-10-2	Y-Axis Magnetometer$_{24-28}$
17	63-66	1-48	26-10-2	Y-Axis Magnetometer$_{29-32}$
	67	49-60	26-10-3	Z-Axis Magnetometer$_{1}$
18	68-72	1-60	26-10-3	Z-Axis Magnetometer$_{2-6}$
19	73-77	1-60	26-10-3	Z-Axis Magnetometer$_{7-11}$
20	78-82	1-60	26-10-3	Z-Axis Magnetometer$_{12-16}$
21	83-87	1-60	26-10-3	Z-Axis Magnetometer$_{17-21}$
22	88-92	1-60	26-10-3	Z-Axis Magnetometer$_{22-26}$
23	93-97	1-60	26-10-3	Z-Axis Magnetometer$_{27-31}$
24	98	1-12	26-10-3	Z-Axis Magnetometer$_{32}$
	99-102	13-60	26-10-4	Z-Axis Range Switch Fine$_{1-4}$
25	103-107	1-60	26-10-4	Z-Axis Range Switch Fine$_{5-9}$
26	108-112	1-60	26-10-4	Z-Axis Range Switch Fine$_{10-14}$
27	113-114	1-24	26-10-4	Z-Axis Range Switch Fine$_{15-16}$
	115-117	25-60	26-10-5	Y-Axis Range Switch Fine$_{1-3}$
28	118-122	1-60	26-10-5	Y-Axis Range Switch Fine$_{4-8}$

S3-2 FLUXGATE DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
29	123-127	1-60	26-10-5	Y-Axis Range Switch $Fine_{9-13}$
30	128-130	1-36	26-10-5	Y-Axis Range Switch $Fine_{14-16}$
	131-132	37-60	26-10-6	Z-Axis Range Switch $Fine_{1-2}$
31	133-137	1-60	26-10-6	Z-Axis Range Switch $Fine_{3-7}$
32	138-142	1-60	26-10-6	Z-Axis Range Switch $Fine_{8-12}$
33	143-146	1-48	26-10-6	Z-Axis Range Switch $Fine_{13-16}$
	147	49-60	26-10-7	X-Axis Range Switch $Course_1$
34	148	1-12	26-10-7	X-Axis Range Switch $Course_2$
	149-150	13-36	26-10-8	Y-Axis Range Switch $Course_{1-2}$
	151-152	37-60	26-10-9	Z-Axis Range Switch $Course_{1-2}$
35	153	1-12	26-10-10	Sensor Temperature
	154	13-24	26-10-11	Electronics Temperature
	155	25-36	26-10-12	Range Switch Temperature
	156-157	37-60	A1	P-Axis Low_{1-2}
36	158-159	1-24	A1	P-Axis Low_{3-4}
	160-162	25-60	A2	P-Axis $High_{1-3}$
37	163	1-12	A2	P-Axis $High_4$
	164-167	13-60	A3	Q-Axis Low_{1-4}
38	168-171	1-48	A4	Q-Axis $High_{1-4}$
	172	49-60	A5	R-Axis Low_1
39	173-175	1-36	A5	R-Axis Low_{2-4}
	176-177	37-60	A6	R-Axis $High_{1-2}$
40	178-179	1-24	A6	R-Axis $High_{3-4}$
	180	25-36	A7	Magnetometer Bias
	181	37-48	A8	Spin Coil Current
	182	49-60	A18	Precession Coil Reg #1 Magnitude
41	183	1-12	A19	Precession Coil Reg #2 Magnitude
		13	A9	Precession Coil Timed Polarity
		14	A10	Spin Coil Spin Up/Down
		15	A11	Precession Coil High/Low Select
		16	A22	Precession Coil On/Off
		17	A23	1/4 Orbit Torqueing Selection
		18	A24	1/4 Orbit Torqueing Selection
		19-60		Vacant

Words 3-41 repeat 12 times per record. 13 seconds of data per record. (NCHHN=182)

S3-2 ESA DATA RECORDS

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2-3	1-24	26-11-1	+5v Monitor$_{1-2}$
	4-5	25-48	26-11-2	+15v Monitor$_{1-2}$
	6	49-60	26-11-3	-5v Monitor$_1$
5	7	1-12	26-11-3	-5v Monitor$_2$
	8-11	13-60	26-11-4	+10v Ref. Monitor$_{1-4}$
6	12	1-12	26-11-5	+28v Monitor
	13	13-24	26-11-6	Temperature Monitor
	14-16	25-60	26-11-7	+3kv Monitor$_{1-3}$
7	17-21	1-60	26-11-7	+3kv Monitor$_{4-8}$
8	22-26	1-60	26-11-8	+3kv Input Current Monitor$_{1-5}$
9	27-29	1-36	26-11-8	+3kv Input Current Monitor$_{6-8}$
	30-31	37-60	26-11-9	-10kv Input Current Monitor$_{1-2}$
10	32-36	1-60	26-11-9	-10kv Input Current Monitor$_{3-7}$
11	37	1-12	26-11-9	-10kv Input Current Monitor$_8$
	38-41	13-60	26-11-10	-10kv Ref. Input Monitor$_{1-4}$
12	42-45	1-48	26-11-10	-10kv Ref. Input Monitor$_{5-8}$
	46	49-60	26-11-11	Electron Counter$_1$
13	47	1-12		
	48-51	13-60	26-11-11	Electron Counter$_{2-3}$
14	52-55	1-48	26-11-11	Electron Counter$_{4-5}$
	56	49-60	26-11-11	Electron Counter$_6$
15	57	1-12		
	58-61	13-60	26-11-11	Electron Counter$_{7-8}$
16	62-65	1-48	26-11-11	Electron Counter$_{9-10}$
	66	49-60	26-11-11	Electron Counter$_{11}$
17	67	1-12		
	68-71	13-60	26-11-11	Electron Counter$_{12-13}$
18	72-75	1-48	26-11-11	Electron Counter$_{14-15}$
	76	49-60	26-11-11	Electron Counter$_{16}$
19	77	1-12		

S3-2 ESA DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
	78-81	13-60	26-11-11	Electron Counter$_{17-18}$
20	82-85	1-48	26-11-11	Electron Counter$_{19-20}$
	86	49-60		
21	87	1-12	26-11-11	Electron Counter$_{21}$
	88-91	13-60	26-11-11	Electron Counter$_{22-23}$
22	92-95	1-48	26-11-11	Electron Counter$_{24-25}$
	96	49-60	26-11-11	Electron Counter$_{26}$
23	97	1-12		
	98-101	13-60	26-11-11	Electron Counter$_{27-28}$
24	102-105	1-48	26-11-11	Electron Counter$_{29-30}$
	106	49-60	26-11-11	Electron Counter$_{31}$
25	107	1-12		
	108-111	13-60	26-11-11	Electron Counter$_{32-33}$
26	112-115	1-48	26-11-11	Electron Counter$_{34-35}$
	116	49-60	26-11-11	Electron Counter$_{36}$
27	117	1-12		
	118-121	13-60	26-11-11	Electron Counter$_{37-38}$
28	122-125	1-48	26-11-11	Electron Counter$_{39-40}$
	126	49-60	26-11-11	Electron Counter$_{41}$
29	127	1-12		
	128-131	13-60	26-11-11	Electron Counter$_{42-43}$
30	132-135	1-48	26-11-11	Electron Counter$_{44-45}$
	136	49-60	26-11-11	Electron Counter$_{46}$
31	137	1-12		
	138-141	13-60	26-11-11	Electron Counter$_{47-48}$
32	142-145	1-48	26-11-11	Electron Counter$_{49-50}$
	146	49-60	26-11-11	Electron Counter$_{51}$
33	147	1-12		
	148-151	13-60	26-11-11	Electron Counter$_{52-53}$
34	152-155	1-48	26-11-11	Electron Counter$_{54-55}$
	156	49-60	26-11-11	Electron Counter$_{56}$
35	157	1-12		
	158-161	13-60	26-11-11	Electron Counter$_{57-58}$

S3-2 ESA DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
36	162-165	1-48	26-11-11	Electron Counter$_{59-60}$
	166	49-60	26-11-11	Electron Counter$_{61}$
37	167	1-12		
	168-171	13-60	26-11-11	Electron Counter$_{62-63}$
38	172-173	1-24	26-11-11	Electron Counter$_{64}$
	174-176	25-60		Vacant

Words 3-38 are repeated 13 times within a record (i.e., 14 seconds per record)

APPENDIX J

S3-2 ESA Data Base Format

ESA PREPROCESS FILE HEADER RECORD

0.1	Word Count (56)
0.2	Group Count (1)
1	Satellite Name (bbbbbb S3-2)
2	Experiment Name (bbbbbbb ESA)
3	Orbit Number
4	Month of year at orbit
5	Day of month of orbit
6	Year of orbit (last 2 digits of 19xx)
7	Start time at data base (GMT-SEC)
8	End time of data base (GMT-SEC)
9	Longitude at start (+E)
10	Longitude at end (+E)
11	Latitude (geocentric) at start
12	Latitude (geocentric) at end
13	Magnetic latitude at start
14	Magnetic latitude at end
15	Invariant latitude at start
16	Invariant latitude at end
17	Repeat 7-16 for a maximum of four time intervals
⋮	
46	DGMT from STF
48	DSTW from STF
49	Start time of vehicle in sun_1 (neg. → N/A)
50	End time of vehicle in sun_1 (neg. → N/A)
51	Start time of vehicle in $shade_1$ (neg. → N/A)
52	End time of vehicle in $shade_2$ (neg. → N/A)
53	Start time of vehicle in sun_2 (neg. → N/A)
54	End time of vehicle in sun_2 (neg. → N/A)

ESA PREPROCESS FILE DATA RECORDS

Data is grouped in two second increments

0.1	Word Count (59)
0.2	Group Count ($\leq$ 8)
1	GMT (at first 00_8 level)
2	Altitude (km)
3	Longitude (+E)
4	Geocentric latitude
5	Geomagnetic latitude
6	Invariant latitude
7	Magnetic field (total field)
8	L-Shell
9	Local time (seconds)
10	Magnetic local time
11-15	Magnetic pitch angle (in .4 second increments)

Counts output is stored as follows: The 10 LSB's contain counts; Bit 11 = overflow (0 = normal, 1 = overflow); MSB (Bit 12) = 0 normally, = 1 if dummy filled where dropout occurred.

Word	Bits	
16	1-12	Counts at 00_8 ↑
	13-24	Counts at 00_8 ↓
	25-36	Counts at 01_8 ↑
	37-48	Counts at 01_8 ↑
	49-60	Counts at 02_8 ↑
17	1-12	Counts at 02_8 ↓
	⋮	
28	1-12	Counts at 36_8 ↑
	13-24	Counts at 36_8 ↓
	25-36	Counts at 37_8 ↑
	37-48	Counts at 37_8 ↑
	49-60	Counts at 37_8 ↓
29	1-12	Counts at 37_8 ↓
	13-24	Counts at 36_8 ↓

Word	Bits	
29 Cont.	25-36	Counts at 36_8 ↓
	37-48	Counts at 35_8 ↓
	49-60	Counts at 35_8 ↓
⋮		
41	1-12	Counts at 01_8 ↓
	13-24	Counts at 00_8 ↓
	25-36	Counts at 00_8 ↓

For monitor storage, MSB=1 if data is dummy filled because of dropout

41	37-48	+5v $Monitor_1$
	49-60	+5v $Monitor_2$
42	1-12	+15v $Monitor_1$
	13-24	+15v $Monitor_2$
	25-36	-5v $Monitor_1$
	37-48	-5v $Monitor_2$
	49-60	+10v Reference $Monitor_1$
43	1-12	+10v Reference $Monitor_2$
	13-24	+10v Reference $Monitor_3$
	25-36	+10v Reference $Monitor_4$
	37-48	+28v $Monitor_1$
	49-60	Temperature $Monitor_1$
44	1-12	+3kv $Monitor_1$
	13-24	+3kv $Monitor_2$
	25-60	+3kv $Monitor_{3-5}$
45	1-12	+3kv $Monitor_6$
	13-36	+3kv $Monitor_{7,8}$
	37-48	+3kv Input Current $Monitor_1$
	49-60	+3kv Input Current $Monitor_2$
46	1-60	+3kv Input Current $Monitor_{3-7}$
47	1-12	+3kv Input Current $Monitor_8$
	13-60	-10kv Input Current $Monitor_{1-4}$
48	1-48	-10kv Input Current $Monitor_{5-8}$
	49-60	-10kv Reference Input $Monitor_1$

ESA PREPROCESS FILE DATA RECORDS (Cont.)

Word	Bits	
49	1-60	-10kv Reference Input Monitor$_{2-6}$
50	1-24	-10kv Reference Input Monitor$_{7-8}$
	25-48	+5v Monitor$_{3-4}$
	49-60	+15v Monitor$_{3}$
51	1-12	+15v Monitor$_{4}$
	13-36	=5v Monitor$_{3-4}$
	37-60	+10v Reference Monitor$_{5-6}$
52	1-24	+10v Reference Monitor$_{7-8}$
	25-36	+28v Monitor$_{2}$
	37-48	Temperature Monitor$_{2}$
	49-60	+3kv Monitor$_{9}$
53	1-60	+3kv Monitor$_{10-14}$
54	1-24	+3kv Monitor$_{15-16}$
	36-60	+3kv Input Current Monitor$_{9-11}$
55	1-60	+3kv Input Current Monitor$_{12-16}$
56	1-60	-10kv Input Current Monitor$_{14-16}$
	37-60	-10kv Reference Input Monitor$_{9-10}$
58	1-60	-10kv Reference Input Monitor$_{11-15}$
59	1-12	-10kv Reference Input Monitor$_{16}$
	13-60	Vacant

APPENDIX K

S3-2 Fluxgate Magnetometer
Data Base Format

FLUXGATE PREPROCESS FILE HEADER RECORD

CDC Word	Information	Format
0.1	Word Count (30)	I
0.2	Group Count (1)	I
1	Vehicle (S3-2)	A
2	Experiment	A
3	Analog Tape Number	A
4	Orbit Number	F
5	Date of Orbit xx/xx/xx	A
6	Date STF Tape Generated (xx/xx/xx)	A
7	Date of Creation of User File (xx/xx/xx)	A
8	Start Time of Data (GMT-SECS)	F
7	Starting Altitude (km)	F
10	Code for Starting Altitude { 1. = increasing; 0. = decreasing }	F
11	Starting Latitude	F
12	Code for Starting Latitude { 1. = increasing; 0. = decreasing }	F
13	End Time of Data (GMT-seconds)	F
14	Altitude at End of Data	F
15	Latitude at End of Data	F
16	Julian Day (from STF)	I
17	STW1	I
18	GMT1 — To calculate GMT from STW	I
19	DGMT — GMT = [GMT1 + (STW-STW1) DGMT/DSTW]/1000	I
20	DSTW	I
21	Inclination of Orbital Plane	F
22	Right Ascension of Ascending Node	F
23	Average Counts for 21-2-4 (for counts > 3)	F
24	Average Counts for 21-4-4 (for counts > 3)	F
25	Mode Monitor for 22-7	F
26, 27, 28, 29, 30	Vacant	

FLUXGATE PREPROCESS DATA RECORDS

0.1	Word count (129)
0.2	Group count ($\leq$ 3)
1	GMT (GMT at start of data frame)
2	x-Field$_1$ (γ's)
3	y-Field$_1$ (γ's)
4	z-Field$_1$ (γ's)
5	x-Field$_2$ (γ's)
6	y-Field$_2$ (γ's)
7	z-Field$_2$ (γ's)
⋮	
95	x-Field$_{32}$ (γ's)
96	y-Field$_{32}$ (γ's)
97	z-Field$_{32}$ (γ's)
98	Bits 1-10 = x_{coarse} Integer +3 for x_1 readout
	11-20 = x_{fine} Integer +15 for x_1 readout
	21-30 = y_{coarse} Integer +3 for y_1 readout
	31-40 = y_{fine} Integer +15 for y_1 readout
	41-50 = z_{coarse} Integer +3 for z_1 readout
	51-60 = z_{fine} Integer +15 for z_1 readout
99	Bits 1-10 = x_{coarse} Integer +3 for x_2 readout
	⋮
129	Bits 51-60 = z_{fine} Integer +15 for z_{32} readout

APPENDIX L

S3-2 MSIV Data Base Format

S3-2 MSIV Ion Data Base Header Record

0.1	Word Count (45)	
0.2	Group Count (1)	
1	S32IONDATA	
2	Orbit No.	
3	Month of Year	
4	Day of month	
5	Year (last 2 digits of 19xx)	
6	Start time of orbit (GMT-sec)	
7	End time of orbit (GMT-sec)	
8	Start time of vehicle in sun (neg N/A)	
9	End time of vehicle in sun (neg N/A)	
10	Start time of vehicle in shade (neg N/A)	
11	End time of vehicle in shade (neg N/A)	
12	GMT (perigee)	
13	Perigee alt (km)	
14	Perigee longitude (+E)	
15	Perigee geodetic latitude	
16	Perigee geomagnetic latitude	
17	Perigee invariant latitude	
18	Perigee local time	
19	Magnetic local time (Perigee)	
20	Perigee Corrected magnetic local time	
21	Commutator 1	From first 8 frames of data in the pass
22	Commutator 2	
23	Commutator 3	
24	Commutator 4	
25	Commutator 5	
26	Commutator 6	
27	Commutator 7	
28	Commutator 8	

S3-2 MSIV Ion Data Base Header Record (Cont.)

29	Commutator 1	
30	Commutator 2	
31	Commutator 3	From last 8 frames of data in the pass
32	Commutator 4	
33	Commutator 5	
34	Commutator 6	
35	Commutator 7	
36	Commutator 8	
37	Mode monitor voltage of perigee	
38	Solar zenith angle at perigee	
39	Magnetic inclination of perigee	
40	Modified dip coordinate of perigee	
41	Code: 1.= Ions only orbit, 2.= Ion/NH	
42-45	(Vacant)	

S3-2 MSTV Ion Data Base - Data Records

0.1	Word Count
0.2	Group Count (11)
1	Time at start of selected frame (GMT - sec)
2	Altitude (km)
3	Geodetic Latitude
4	Geomagnetic Latitude
5	Corrected geomagnetic latitude
6	Invariant latitude
7	L-shell
8	Longitude (+E)
9	Magnetic local time
10	Corrected magnetic local time
11	Local time
12	Solar Zenith Angle
13	Modified dip latitude
14	I_{14}
15	I_{30}
16	I_{28}
17	I_{16}
18	I_1 (set = -1. if orbit is Ion/NH)
19	I_4 (set = -1. if orbit is Ion/NH)
20	α_{14} at time of I_{14} (α = attack angle)
21	α_{30}
22	α_{28}
23	α_{16}
24	α_1
25	α_4
26	β_{14} (β = magnetic pitch) at time of I_{14}
27	β_{30}
28	β_{28}
29	β_{16}
30	β_1
31	β_4
32	γI_i (i=14,30,28,16,1,4 for ion only, i=14,30,28,16)

S3-2 MSIV Ion Data Base - Data Records (cont.)

33	RA_1	(Translated to ram)
34	α_{RA_1}	
35	RA_2	(Translated to ram)
36	α_{RA_2}	
37	RA_3	(Translated to ram)
38	α_{RA_3}	
39	TI_1	(TI = total ions - Not translated to ram)
40	TI_2	
41	TI_3	
42	TI_4	
43	Beam monitor$_1$	The first 2 of the 4 beam monitor readouts per sec.
44	Beam monitor$_2$	
45	High Voltage monitor$_1$	The first of the 2 readouts per sec.
46	Vacant	

Data words represented by 1-46 will appear a maximum of 11 times per record.

S3-2 MSIV NII Data Base Header Record

0.1	Word Count
0.2	Group Count (1)
1	S32NIDATA
2	Orbit No.
3	Month of year
4	Day of month
5	Year (last two digits of 19xx)
6	Start time of orbit (GMT-sec)
7	End time of orbit (GMT-sec)
8	Start time of vehicle in sun (neg → N/A)
9	End time of vehicle in sun (neg → N/A)
10	Start time of vehicle in shade (neg → N/A)
11	End time of vehicle in shade (neg → N/A)
12	GMT (perigee)
13	Perigee alt (km)
14	Perigee longitude (+E)
15	Perigee geodetic latitude
16	Perigee geomagnetic latitude
17	Perigee invariant latitude
18	Perigee local time
19	Perigee magnetic local time
20	Perigee corrected magnetic local time
21	Commutator 1
22	Commutator 2
23	Commutator 3
24	Commutator 4
25	Commutator 5
26	Commutator 6
27	Commutator 7
28	Commutator 8

From first 8 frames of data in the pass.

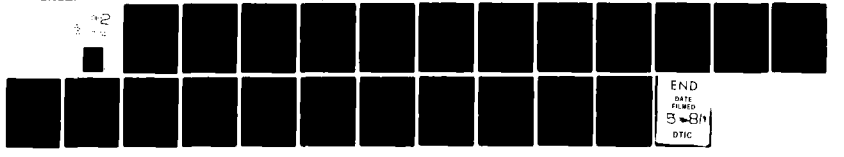
S3-2 MSIV NH Data Base Header Record (cont.)

29	Commutator 1	From last 8 frames of data in the pass.
30	Commutator 2	
31	Commutator 3	
32	Commutator 4	
33	Commutator 5	
34	Commutator 6	
35	Commutator 7	
36	Commutator 8	
37	Mode monitor voltage at perigee	
38	Solar zenith angle at perigee	
39	Magnetic inclination of perigee	
40	Modified dip coordinate of perigee	
41	Vacant	
42-45	Vacant	

S3-2 MSIV NII Data Base - Data Records

0.1	Word Count (60)
0.2	Group Count ($\leq$ 8)
1	GMT at point closest to ram (sec)
2	Altitude (km)
3	Geodetic latitude
4	Geomagnetic latitude
5	Corrected geomagnetic latitude
6	Invariant latitude
7	L-shell
8	Longitude (+E)
9	Magnetic local time
10	Corrected magnetic local time
11	Local time
12	Solar Zenith angle
13	Modified dip latitude
14	T_1 ram
15	I_1 ram
16	I_1 wake
17	T_4 ram
18	I_4 ram
19	I_4 wake
20	T_7 ram
21	I_7 ram
22	I_7 wake
23	T_{14} ram
24	I_{14} ram
25	I_{14} wake
26	T_{30} ram
27	I_{30} ram
28	I_{30} wake
29	T_{28} ram
30	I_{28} ram
31	I_{28} wake
32	T_{16} ram
33	I_{16} ram

AD-A097 748 BOSTON COLL CHESTNUT HILL MA SPACE DATA ANALYSIS LAB F/G 9/2
DATA ANALYSIS SYSTEMS AND DATA BASE DEVELOPMENT FOR THE S3 SATE--ETC(U)
JAN 80 D E DELOREY, P N PRUNEAU F19628-76-C-0190
UNCLASSIFIED BC-SDAL-80-2 AFGL-TR-80-0006 NL



END
DATE FILMED
5-81
DTIC

34	I_{16} wake
35	T_{38} ram
36	I_{38} ram
37	I_{38} wake
38	$T_{41.5}$ ram
39	$I_{41.5}$ ram
40	$I_{41.5}$ wake
41	α_1 (attack angle - amu 1, +=into ram; -=out of ram)
42	α_4 (attack angle - amu 4, +=into ram; -=out of ram)
43	α_7 (attack angle - amu 7, +=into ram; -=out of ram)
44	α_{14} (attack angle - amu 14, +=into ram; -=out of ram)
45	α_{30} (attack angle - amu 30, +=into ram; -=out of ram)
46	α_{28} (attack angle - amu 28, +=into ram; -=out of ram)
47	α_{16} (attack angle - amu 16, +=into ram; -=out of ram)
48	α_{38} (attack angle - amu 38, +=into ram; -=out of ram)
49	$\alpha_{41.5}$ (attack angle - amu 41.5, +=into ram; -=out of ram)
50	RA_4
51	RA_5
52	RA_6
53	RA_7
54	RA_8
55	Beam $Monitor_3$
56	Beam $Monitor_4$
57	High Voltage $Monitor_2$
58, 59, 60	Vacant

APPENDIX M

S3-2 IDG Data Base Format

Header Record

0.1	Word count (37)	I
0.2	Group count (1)	I
1	Orbit No.	F
2	Month of Orbit	F
3	Day of Orbit	F
4	Year of orbit (last two digits of 19xx)	F
5	K_p for orbit (6.7 hr lag)	F
6	F10.7 cm flex for orbit	F
7	Start time of orbit (GMT sec)	F
8	End time of orbit (GMT sec)	F
9	Start time of vehicle in sun	F
10	End time of vehicle in sun	F
11	Start time of vehicle in shade	F
12	End time of vehicle in shade	F
13	Perigee time (GMT sec)	F
14	Perigee latitude (km)	F
15	Perigee longitude (+E)	F
16	Perigee latitude	F
17	Local time of perigee (sec)	F
18	Electronics temperature (average)	F
19	Gauge temperature (representative value)	F
20	Vacant	F
21	a_0	Coefficients to least square fit for downleg data where $\log p = \sum_{i=0} a_i z^i - 16$ p=density, a=altitude, $z \leq 370$ km
22	a_1	
23	a_2	
24	a_3	
25	a_4	

26	b_0	Coefficients for upleg data fit
27	b_1	$\text{Log } p = \sum_{i=0}^{4} b_i z^i - 16$
28	b_2	
29	b_3	$z \leq 350$ km
30	b_4	
31	SATb S3-2bb	
32	Eccentricity	
33	Inclination	
34	F10.7 flux (3 month average)	
35	Magnetic local time of perigee	
36	L-shell of perigee	
37	(Vacant)	

0.1	Word count (23)	I
0.2	Group count ($\leq$22)	I
1	Time (ram) GMT sec.	F
2	Altitude (km)	F
3	Longitude (+E)	F
4	Latitude (Geodetic)	F
5	Magnetic latitude	F
6	Local time (seconds)	F
7	I (current at 40° going into ram)	F
8	P_g (pressure at 40° going into ram)	F
9	R(s,D,α) (R factor at 40° going into ram)	F
10	I (Current at 40° going out of ram)	
11	P_g (pressure at 40° going out of ram)	
12	R(s,D,α) (R factor at 40° out of ram)	
13	Pressure into ram (from fit)	
14	Pressure out of ram (from fit)	
15	Average pressure (average of 13,14 above)	
16	Measured density	
17	Model density (J 71)	
18	Model temperature (J 71)	
19	Model pressure (J 71)	
20	High Voltage	
21	Probable mass (M)	
22	P_g at wake	
23	(Vacant)	

APPENDIX N

S3-3 User File Formats

HEADER RECORD FOR DATA FILES OF VEHICLE (S3-3)

CDC Word	Information	Format
0.1	Word Count (30)	I
0.2	Group Count (1)	I
1	Vehicle (S3-3)	R
2	Experiment	R
3	Analog Tape Number	R
4	Orbit Number	F
5	Date of orbit xx/xx/xx	R
6	Date STF tape generated xx/xx/xx	R
7	Date of creation of user file xx/xx/xx	R
8	Start time of data (GMT-SECS)	F
9	Starting altitude (km)	F
10	Code for starting altitude {1. = increasing; 0. = decreasing}	F
11	Starting latitude	F
12	Code for starting latitude {1. = increasing; 0. = decreasing}	F
13	End time of data (GMT-SECS)	F
14	Altitude at end of data	F
15	Latitude at end of data	F
16	Julian Day (from STF)	I
17	STW1 — To calculate GMT from STW	I
18	GMT1 — GMT = [GMT1 + (DTW-STW1)DGMT/DSTW]/1000 .	I
19	DGMT	I
20	DSTW	I
21	Inclination of orbital plane	F
22	Right ascension of ascending node	F
23	Vacant	
24		
25		
26		
27		
28		
29		
30		

S3-3 EXPERIMENT 214 DATA RECORDS

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word count (25)
2	0.2	1-60		Group count ($\leq$20)
3	1	1-60		STW
4	2-6	1-60	14-2-8	Digital Data - Proton $Flux_{1-5}$
5	7-11	1-60	14-2-8	Digital Data - Proton $Flux_{6-10}$
6	12-16	1-60	14-2-8	Digital Data - Proton $Flux_{11-15}$
7	17-21	1-60	14-2-8	Digital Data - Proton $Flux_{16-20}$
8	22-26	1-60	14-2-8	Digital Data - Proton $Flux_{21-25}$
9	27-31	1-60	14-2-8	Digital Data - Proton $Flux_{26-30}$
10	32-33	1-24	14-2-8	Digital Data - Proton $Flux_{31-32}$
	34-36	25-60	14-4-7	Digital Data - Proton $Flux_{1-3}$
11	37-41	1-60	14-4-7	Digital Data - Proton $Flux_{4-8}$
12	42-46	1-60	14-4-7	Digital Data - Proton $Flux_{9-13}$
13	47-51	1-60	14-4-7	Digital Data - Proton $Flux_{14-18}$
14	52-56	1-60	14-4-7	Digital Data - Proton $Flux_{19-23}$
15	57-61	1-60	14-4-7	Digital Data - Proton $Flux_{24-28}$
16	62-65	1-48	14-4-7	Digital Data - Proton $Flux_{29-32}$
	66	49-60	14-6-11	Low-level threshold
17	67	1-12	14-6-12	Upper level threshold
	68	13-24	14-6-13	Low level threshold
	69	25-36	14-6-14	Upper level threshold
	70-71	37-60	14-6-15	
18	72-74	1-36	14-6-15	Measures Proton & Alpha Particle Flux
	75-76	37-60	A1	P-axis low_{1-2}
19	77-78	1-24	A1	P-axis low_{3-4}
	79-81	25-60	A2	P-axis $high_{1-3}$
20	82	1-12	A2	P-axis $high_4$
	83-86	13-60	A3	Q-axis low_{1-4}
21	87-90	1-48	A4	Q-axis $high_{1-4}$
	91	49-60	A5	R-axis low_1
22	92-94	1-36	A5	R-axis low_{2-4}
	95-96	37-60	A6	R-axis $high_{1-2}$

S3-3 EXPERIMENT 214 DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
23	97-98	1-24	A6	R-axis high$_{3-4}$
	99	25-36	A7	Magnetometer bias
	100	37-48	14-2-1	-200 v Det. Mon.
	101	49-60	14-2-2	+10 v Preamp. Mon.
24	102	1-12	14-2-3	Elect. Temp.
	103	13-24	14-2-4	+2.5 v Mon.
	104	25-36	14-2-5	Detector Temp.
	105	37-48	14-2-6	-2.5 v Mon.
	106	49-60	14-4-1	-200 v Mon.
25	107	1-12	14-4-2	+10 v Power Mon.
	108	13-24	14-4-3	Electronics Temp.
	109	25-36	14-4-4	+2.5 v Monitor
	110	37-48	14-4-5	Detector Mon.
	111	49-60	14-4-6	-2.5 v Monitor
26	112	1-12	14-6-1	5.0 v Ref.
	113	1-12	14-6-2	2.5 v Ref.
	114	13-24	14-6-3	0.0 v Ref.
	115	25-36	14-6-4	28 v Mon.
	116	37-48	14-6-5	+15 v Mon.
	117	49-60	14-6-6	+5 v Mon.
27	118	1-12	14-6-7	-5 v Mon.
	119	13-24	14-6-8	Bias Mon.
	120	25-36	14-6-4	Elec. Temp.
	121	37-48	14-6-10	Det. Temp.

Words 3-27 are repeated 19 times within a record, (i.e., 20 seconds per record)

CDC Word	Data Word	Bits	Desig.	Description
1	0.1	1-60		Word count
2	0.2	1-60		Group count
3	1	1-60		STW
4	2-6	1-60	15-2-1	Current from Sensor $\#2_{1-5}$
5	7-11	1-60	15-2-1	Current from Sensor $\#2_{6-10}$
6	12-16	1-60	15-2-1	Current from Sensor $\#2_{11-15}$
7	17-21	1-60	15-2-1	Current from Sensor $\#2_{16-20}$
8	22-26	1-60	15-2-1	Current from Sensor $\#2_{21-25}$
9	27-31	1-60	15-2-1	Current from Sensor $\#2_{26-30}$
10	32-33	1-24	15-2-1	Current from Sensor $\#2_{31-32}$
	34-36	25-60	15-2-2	Sum and Difference $Ratio_{1-3}$
11	37-41	1-60	15-2-2	Sum and Difference $Ratio_{4-8}$
12	42-46	1-60	15-2-2	Sum and Difference $Ratio_{9-13}$
13	47-51	1-60	15-2-2	Sum and Difference $Ratio_{14-18}$
14	52-56	1-60	15-2-2	Sum and Difference $Ratio_{19-23}$
15	57-61	1-60	15-2-2	Sum and Difference $Ratio_{24-28}$
16	62-65	1-48	15-2-2	Sum and Difference $Ratio_{29-32}$
	66	49-60	15-2-3	Current from Sensor $\#4_1$
17	67-71	1-60	15-2-3	Current from Sensor $\#4_{2-6}$
18	72-76	1-60	15-2-3	Current from Sensor $\#4_{7-11}$
19	77-81	1-60	15-2-3	Current from Sensor $\#4_{12-16}$
20	82-86	1-60	15-2-3	Current from Sensor $\#4_{17-21}$
21	87-91	1-60	15-2-3	Current from Sensor $\#4_{22-26}$
22	92-96	1-60	15-2-3	Current from Sensor $\#4_{27-31}$
23	97	1-12	15-2-3	Current from Sensor $\#4_{32}$
	48-101	13-60	15-2-4	Sum and Difference $Ratio_{1-4}$
24	102-406	1-60	15-2-4	Sum and Difference $Ratio_{5-9}$
25	107-111	1-60	15-2-4	Sum and Difference $Ratio_{10-14}$
26	112-116	1-60	15-2-4	Sum and Difference $Ratio_{15-19}$
27	117-121	1-60	15-2-4	Sum and Difference $Ratio_{20-24}$
28	122-126	1-60	15-2-4	Sum and Difference $Ratio_{25-29}$
29	127-129	1-36	15-2-4	Sum and Difference $Ratio_{30-32}$
	130-131	37-60	15-2-5	$Electrons_{1-2}$

S3-3 EXPERIMENT 215 DATA RECORDS (Cont.)

CDC Word	Data Word	Bits	Desig.	Description
30	132-136	1-60	15-2-5	$Electrons_{4-8}$
31	137-141	1-60	15-2-5	$Electrons_{9-13}$
32	142-146	1-60	15-2-5	$Electrons_{14-18}$
33	147-151	1-60	15-2-5	$Electrons_{19-23}$
34	152-156	1-60	15-2-5	$Electrons_{24-28}$
35	157-161	1-60	15-2-5	$Electrons_{29-33}$
36	162-166	1-60	15-2-5	$Electrons_{34-38}$
37	167-171	1-60	15-2-5	$Electrons_{39-43}$
38	172-176	1-60	15-2-5	$Electrons_{44-48}$
39	177-181	1-60	15-2-5	$Electrons_{49-53}$
40	182-186	1-60	15-2-5	$Electrons_{54-58}$
41	187-191	1-60	15-2-5	$Electrons_{59-63}$
42	192	1-12	15-2-5	$Electrons_{64}$
	193-196	13-60	15-2-7	Current from Sensor $\#1_{1-4}$
43	197-201	1-60	15-2-7	Current from Sensor $\#1_{5-9}$
44	202-206	1-60	15-2-7	Current from Sensor $\#1_{10-14}$
45	207-211	1-60	15-2-7	Current from Sensor $\#1_{15-19}$
46	212-216	1-60	15-2-7	Current from Sensor $\#1_{20-24}$
47	217-221	1-60	15-2-7	Current from Sensor $\#1_{25-29}$
48	222-224	1-36	15-2-7	Current from Sensor $\#1_{30-32}$
	225-226	37-60	15-2-8	Current from Sensor $\#3_{1-2}$
49	227-231	1-60	15-2-8	Current from Sensor $\#3_{3-7}$
50	232-236	1-60	15-2-8	Current from Sensor $\#3_{8-12}$
51	237-241	1-60	15-2-8	Current from Sensor $\#3_{13-17}$
52	242-246	1-60	15-2-8	Current from Sensor $\#3_{18-22}$
53	247-251	1-60	15-2-8	Current from Sensor $\#3_{23-27}$
54	252-256	1-60	15-2-8	Current from Sensor $\#3_{28-32}$
55	257-261	1-60	15-2-9	Sum and Difference $Ratio_{1-5}$
56	262-266	1-60	15-2-9	Sum and Difference $Ratio_{6-10}$
57	267-271	1-60	15-2-9	Sum and Difference $Ratio_{11-15}$
58	272-276	1-60	15-2-9	Sum and Difference $Ratio_{16-20}$

CDC Word	Data Word	Bits	Desig.	Description
59	277-281	1-60	15-2-9	Sum and Difference Ratio$_{21-25}$
60	282-286	1-60	15-2-9	Sum and Difference Ratio$_{26-30}$
61	287-291	1-60	15-2-9	Sum and Difference Ratio$_{31-35}$
62	292-296	1-60	15-2-9	Sum and Difference Ratio$_{36-40}$
63	297-301	1-60	15-2-9	Sum and Difference Ratio$_{41-45}$
64	302-306	1-60	15-2-9	Sum and Difference Ratio$_{46-50}$
65	307-311	1-60	15-2-9	Sum and Difference Ratio$_{51-55}$
66	312-316	1-60	15-2-9	Sum and Difference Ratio$_{56-60}$
67	317-321	1-60	15-2-9	Sum and Difference Ratio$_{61-65}$
68	322-326	1-60	15-2-9	Sum and Difference Ratio$_{66-70}$
69	327-331	1-60	15-2-9	Sum and Difference Ratio$_{71-75}$
70	332-336	1-60	15-2-9	Sum and Difference Ratio$_{76-80}$
71	337-341	1-60	15-2-9	Sum and Difference Ratio$_{81-85}$
72	342-346	1-60	15-2-9	Sum and Difference Ratio$_{86-90}$
73	347-351	1-60	15-2-9	Sum and Difference Ratio$_{91-95}$
74	352-356	1-60	15-2-9	Sum and Difference Ratio$_{96-100}$
75	357-361	1-60	15-2-9	Sum and Difference Ratio$_{101-105}$
76	362-366	1-60	15-2-9	Sum and Difference Ratio$_{106-110}$
77	367-371	1-60	15-2-9	Sum and Difference Ratio$_{111-115}$
78	372-376	1-60	15-2-9	Sum and Difference Ratio$_{116-120}$
79	377-381	1-60	15-2-9	Sum and Difference Ratio$_{121-125}$
80	382-384	1-36	15-2-9	Sum and Difference Ratio$_{126-128}$
	385-386	37-60	15-2-10	Range of 215-1_{1-2}
81	387-391	1-60	15-2-10	Range of 215-1_{3-7}
82	392-396	1-60	15-2-10	Range of 215-1_{8-12}
83	397-401	1-60	15-2-10	Range of 215-1_{13-17}
84	402-406	1-60	15-2-10	Range of 215-1_{18-22}
85	407-411	1-60	15-2-10	Range of 215-1_{23-27}
86	412-416	1-60	15-2-10	Range of 215-1_{28-32}
87	417-421	1-60	15-2-10	Range of 215-1_{33-37}
88	422-426	1-60	15-2-10	Range of 215-1_{38-42}
89	427-431	1-60	15-2-10	Range of 215-1_{43-47}

S3-3 EXPERIMENT 215 DATA RECORDS (Cont.)

CDC Word	Data Words	Bits	Desig.	Description
90	432-436	1-60	15-2-10	Range of 215-1$_{48-52}$
91	437-441	1-60	15-2-10	Range of 215-1$_{53-57}$
92	442-446	1-60	15-2-10	Range of 215-1$_{58-62}$
93	447-448	1-24	15-2-10	Range of 215-1$_{63-64}$
	449	25-36	15-2-11	Temp. of 215-1 package
	450	37-48	15-2-12	E.D. Amplifier Temp.
	451	49-60	15-2-13	Temp. of 215-2 package
94	452	1-12	15-2-14	Monitors Rate Probe

Words 3-94 are repeated 4 times within a record (i.e., 5 seconds per record)

APPENDIX O

S3-4 AGENCY TAPE FORMATS

FORMAT OF HEADER RECORD (Completely in EBCDIC)

FOR GRL 737 PFA/CCG TAPE

BYTE NO.	DESCRIPTION	EXAMPLE
1-4	Vehicle ID	S3-4
5-12	User ID	CRL 737
13-16	Data Format	32Kt or 64Kb
17-24	Analog Tape #	COOK 0123
25-32	Digital Tape # (100%)	5-4000bb
33-40	Digital Tape # (User-specific)	5-5000bb
41-44	REV #	0123
45-48	Year	1977
49-52	Julian Day of Year	0246
53-58	UT Seconds Start of Data	034560
59-64	UT Seconds End of Data	035600
65-72	Data Rate MSEC/Frame	32.00140 or 16.00070
73-78	Scan Counts	000050
79-84	CRL-737 PFA Event Counts	000256
85-90	CRL-737 CCG Event Counts	000412
91-170	Comments, Blank-Filled	CRL 737 PFA-and-CCG-Tape (left justified with trailing blanks)
171-180	Blanks	bbbbbbbbbb

FORMAT OF HEADER RECORD (Completely in EBCDIC Format)

FOR CRL 726 TAPE

BYTE NO.	DESCRIPTION	EXAMPLE
1-4	Vehicle ID	S3-4
5-12	User ID	CRL-726
13-16	Data Format	32Kb or 64Kb
17-24	Analog Tape #	COOK 0123
25-32	Digital Tape # (100%)	S-4000bb
33-40	Digital Tape # (User Specific)	S-50000bb
41-44	REV #	0123
45-48	Year	1977
49-52	Julian Day of Year	0246
53-58	UT Seconds start of data	034560
59-64	UT Seconds end of data	035600
65-72	Data Rate MSEC/Frame	32.00140 or 16.00070
73-78	Scan Counts	000050
79-84	CRL-726 Slit Mode Event Counts	000100
85-90	CRL-726 Filter Position Event Counts	000075
91-96	CRL-726 Aperture Position Event Counts	000082
97-176	Comments, Blank-Filled	CRL 726 Tape (left justified with trailing blanks)
177-180	Blanks	bbbb

FORMAT OF HEADER RECORD (Completely in EBCDIC Format)

FOR CRL 737 ROCA TAPE

BYTE NO.	DESCRIPTION	EXAMPLE
1-4	Vehicle ID	S3-4
5-12	User ID	CRL-737
13-16	Data Format	32Kb or 64Kb
17-24	Analog Tape #	COOK 0123
25-32	Digital Tape # (100%)	S-4000bb
33-40	Digital Tape # (User-specific)	S-5000bb
41-44	REV #	0123
45-48	Year	1977
49-52	Julian Day of Year	0246
53-58	UT Seconds start of data	034560
65-72	Data Rate MSEC/Frame	32.00140 or 16.00070
73-78	Scan Counts	000050
79-84	CRL 737 ROCA Event Counts	000094
85-164	Comments, Blank-Filled	CRL 737 ROCA Tape (left justified with trailing blanks)
165-180	Blanks	

FORMAT OF EVENT RECORD (Completely in EBCDIC)

FOR 100% TAPE AND ALL USER-SPECIFIC TAPES

BOTH FORMAT A AND C

Each logical event record consists of 20 bytes as follows:

BYTES	INFORMATION	COMMENTS
1-8	UTC time tag in MSEC	Range from 00000000 to 86399999
9-16	VST in 0.2 counts	Range from 000000.0 to 838860.6
17-18	Frame ID	Range from 01 to 32 or 64
19	Event Definition Number	Range from 01 to 07
20	Event Status Number	Range from 00 to 09, depending on event definition number

Each physical record on tape consists of 90 logical records, for a total of 1800 bytes per physical record.

If the total number of logical records meaningful to the user is not divisible by 90, then the last physical event record will have its excess logical records at the end blank-filled.

The count of logical records meaningful to the user, plus the event-specific counts, are all in the header record.

FORMAT OF SCAN RECORD (Completely in EBCDIC)

FOR 100% TAPE AND ALL USER-SPECIFIC TAPES,

BOTH FORMAT A AND C

Each logical scan record consists of 24bytes as follows:

BYTES	INFORMATION	COMMENTS
1-8	UTC time tag in MSEC	Range from 00000000 to 86399999
9-16	VST in 0.2 Counts	Range from 000000.0 to 838860.6
17-18	Frame ID	Range from 01 to 32 or 64
19-24	Sync Status	'Search', 'Verify', or 'block'

First logical record in first physical record should show Verify sync status. Last meaningful logical record in last physical record should show Search sync status.

Each physical record on tape consists of: 75 logical records, for a total of 1800 bytes per physical record.

If the last physical scan record has fewer than 75 meaningful logical records (because the scan count, which shows the total number of logical records is not divisible by 75), the excess logical records at the end of the last physical record will be blank-filled.

The scan count (count of logical scan records) is in the header record.

Format for CRL 737 (ROCA)

TELEMETRY RECORDS (Format A and Format C)

Byte #	Description
1-4	GMT (milliseconds) (At start of mainframe containing SUBCOM 1)
5-7	H100-H123 (at SUBCOM 1)
8	MF ID (H002)
9	H901
10	H902
11	H210
12	K223
13-14	SUBCOM (MT 25 and MF 26)
15-17	H100-H123 (at SUBCOM 2)
18	MF ID $(H002)_b$
.	.
.	.
.	.
23-24	SUBCOM
25	H100-H123 (at SUBCOM 3)
.	.
.	.
.	.
315-317	H100-H123 (at SUBCOM 32)
318	MF ID (H002)
319	H901
320	H902
321	K210
322	K223
323-324	SUBCOM
325-328	GMT (milliseconds)
329-331	H100-H123 (SUBCOM 1 for Format A; SUBCOM 33 for Format CO)
.	.
.	.
.	.
647-648	SUBCOM
.	.
.	.
.	.
3239-3240	SUBCOM

By storing 10 groups of data represented as in bytes 1 through 324, 10 masterframes of Format A or 5 masterframes of Format C may be stored in each physical record.

Format for CRL 726 (Spectrometer/Photometer)

TELEMETRY RECORDS (Format A and Format C)

Byte #	Description
1-4	GMT (milliseconds) at start of mainframe containing SUBCOM 1
5-7	VCTW for mainframe containing SUBCOM 1
8	H002
9	H901
10	H902
11	K101
12	K103
13	K104
14	K106
15	K121
16	K123
17-21	K140-K144 (right adjusted)
22-26	K140-K144 (right adjusted)
27-31	K140-K144 (right adjusted)
32-36	K140-K144 for Format A; Dummy fill for Format C
37-41	K140-K144 for Format A; Dummy fill for Format C
42-46	K140-K144 for Format A; Dummy fill for Format C
47	K102
48	K105
49	K107
50	K122
51-52	K150-K151
53-54	K150-K151
55-56	K150-K151
57-58	SUBCOM from mainframe 1 (Format A = MF82/83; Format C = Mf 42/43)
59-112	Repeat word order of bytes 5-58 for MF containing SUBCOM 2
.	.
.	.
.	.
1678-1732	Repeat word order of bytes 5-58 for MF containing SUBCOM 32
1733-1736	GMT (at MF containing SUBCOM 1 on Format A; SUBCOM 33 on Format C)
1737-1739	VCTW (at MF containing SUBCOM 1 on Format A; SUBCOM 33 on Format C)
.	.
.	.
.	.
3463-3464	SUBCOM (SUBCOM 32 for Format A; SUBCOM 64 for Format C)
3465	Vacant

Guideline Format for CRL 737 PFA/CCG

TELEMETRY RECORDS (Format A and Format C)

Byte #	Description
1-4	GMT (milliseconds) (GMT at start of mainframe containing SUBCOM 1)
5-7	VCTW (at SUBCOM 1)
8	H002
9	H901
10	H902
11	K205
12	K206
13	K206
14	Format A = Dummy Fill; Format C = K206
15	K207
16	K208
17	K209
18	K222 (Right Adjusted)
19	K201
20	Format A = Dummy Fill; Format C = K201
21	Format A = Dummy Fill; Format C = K201
22	K202
23	K203
24	K204
25	K211
26	Format A = Dummy Fill; Format C = K211
27	K221 (Right Adjusted)
28-29	SUBCOM, (Format A = MF 25/26; Format C = MF 69/70
30-31	SUBCOM, (Format A = MF 82/83; Format C = MF 42/43
32	One Fill

Repeat 5-32 up to 900 bytes for a logical record

Repeat 1-900 four times for physical record

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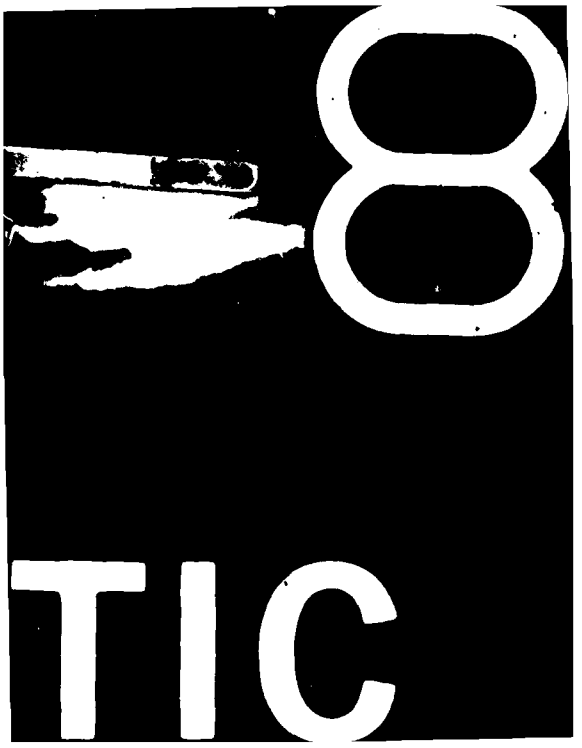
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